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MEMORANDUM FOR: Deputy Director for Intelligence

FROM :

[redacted]  
Deputy Director for Economic-  
Resource Analysis  
Office of Global Issues

SUBJECT :

NSSD 9-82 Energy Outlook and Security  
for the 1980s [redacted]

1. Attached are Sections I and II A, B, and C of NSSD 9-82 on Energy Security. These portions of the study were prepared under the chairmanship of the Agency. Primary drafting of these sections was done by the Energy Markets Branch within OGI with contributions from material prepared for NSSD 4-82 by NESA and SOVA. Also contributing to these sections of the study were the Departments of State, Energy, and Defense. The study has been coordinated with the National Security Council, the Departments of State, Energy, Defense and Treasury, the Council of Economic Advisors, the Office of the Joint Chiefs of Staff, the Defense Intelligence Agency, the Office of Management and Budget and the White House Office of Policy Development. [redacted]

2. The main conclusions of the attached sections include:

- o Market Outlook -- Available industry and government projections of long term energy supply and demand all indicate moderate growth in Free World energy demand through the end of the century. Free World energy consumption is expected to rise at an average annual rate of 2.2 percent during this decade from 94 million b/d oil equivalent in 1980 to 116-119 million b/d oil equivalent in 1990. All forecasts agree that the oil market will remain soft over the next three to four years with consumption growing only slowly. We believe, however, that a plausible range of oil consumption estimates for 1990 could be 48 to 55 million b/d. Consumption at the high end of the range would likely push oil prices up to about the \$40 per barrel level.

- o Disruption Analysis -- Surplus oil productive capacity currently totals about 10 million b/d, an amount

[redacted] 25X1 [redacted]

SUBJECT: NSSD 9-82 Energy Outlook and Security for the 1990s

sufficient to handle even a moderate supply disruption assuming supplies from Saudi Arabia were not cut off. The excess in productive capacity of 6-9 million b/d projected for 1985 is sufficient to protect the market from all but major supply disruptions assuming all other producers are able to operate at or near capacity. Estimates of available surplus capacity in 1990 range from about 1 million b/d under a high demand case to 8 million b/d under a low demand case. Realization of demand levels under the high demand case would leave the oil market vulnerable to even small supply disruptions. [ ]

3. The disruption analysis prepared by the Agency represents a new and unique approach to the assessment of oil market vulnerabilities. Key elements of this analysis include:

- o Specification of disruptions into five classes based on the amount of productive capacity lost.
- o Examination of possible events which could cause these disruptions and the supply losses associated with each event.
- o Discussions of the duration and likelihood of each event. [ ]

4. Completion of the Agency contribution to NSSD 9-82 depended heavily on the cooperation of NESA, SOVA and ALA. All provided economic, political, and military assessments which were incorporated into the study. Tasking on NESA, which served as a point of reference for all the regional offices, was particularly heavy. [ ]

5. The Agency also has been asked by the NSC to pull together and re-draft Section II D which had been prepared under the chairmanship of the State Department and covers the economic impact of energy supply disruptions. [ ]

6. Upon completion, NSSD 9-82 should provide a framework for U.S. energy security policies and allow the assessment of the role, adequacy and relationship of existing policies. It is designed to result in a National Security Decision Directive establishing a comprehensive policy for U.S. energy security

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requirements. Whether this actually materializes is anyone's  
guess.

Attachment:  
As stated

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Energy Market Outlook

The success of long term forecasts in predicting outcomes in the world energy market has been minimal. Because of uncertainties regarding economic performance, price trends, and consumer response to higher prices, most forecasts have substantially overestimated energy demand in recent years and understated the energy savings from conservation and technological change. In addition, most forecasters have been wrong about supply availability, failing to predict the large increases that have occurred in Mexican production in recent years and predicting a noticeable drop in US production which has failed to materialize as yet. Recent long term forecasts remain vulnerable to the shortcomings of past projections because most of the results are based on assumptions about highly uncertain variables such as economic growth, energy prices, and the degree of response of supply and demand to changes in prices. Because of the uncertain nature of energy market forecasts, we have examined them with an eye toward formulating a reasonable range of demand for energy generally and oil in particular. [REDACTED]

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Recent Industry and Government Forecasts

The survey of recent energy market projections include estimates by major oil companies, governments, consulting firms and international organizations completed in late 1981 and early 1982. Many of these forecasts do not use econometric models but are built from the estimates of various regional markets. The energy projection tables in the appendix array these forecast results. The summary table (Table 1) provides the ranges in 1985, 1990 and 2000 for those forecasts which we believe fall within a plausible range. A few forecasts lie outside this range but were rejected because of analytic inconsistencies in how the forecast was prepared. [REDACTED]

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The available projections of long term energy supply and demand all indicate moderate growth in Free World energy demand through the end of the century. Free World energy consumption is expected to rise at an average annual rate of 2.2 percent during this decade from 94 million b/d oil equivalent in 1980 to 116-119 million b/d oil equivalent in 1990. Free World energy demand is projected to range between 143-152 million b/d oil equivalent in 2000. Most of the growth is expected to be met by non-oil fuels, primarily coal and nuclear power. [REDACTED]

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Energy demand is expected to grow faster in developing countries, particularly oil producing countries, than in the OECD countries. OECD's share of total Free World energy demand is projected to decline from 85 percent in 1980 to roughly 75 percent in 1990 and 70 percent in 2000. In sharp contrast,

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Fr World Energy Supply and Demand Projections<sup>1</sup>Summary Table  
(million b/d oil equivalent)

	1980	1985	1990	2000
Total Free World Energy Consumption	94	102-107	116-119	143-152
Free World Oil Consumption	49	48-52	50-53	55-58
OECD	38	35-39	33-38	31-35
Rest of Free World	11	13-15	15-18	21-24
Free World Oil Supply	50	48-52	48-53	49-58
OECD	15	13-16	12-16	13-17
OPDC	28	23-28	23-29	24-30
Other LDCs	6	8-9	8-11	9-13
Net Communist (Imports) Exports	1	(1)-1	(2)-1	(1)-1
OPDC Oil Production Capacity				
Maximum Sustainable	33-34	30-35	29-41	26-43
Available		23-33	27-32	24-32
US Total Energy	36	37-41	40-43	43-45
Non-oil Consumption	19	21-24	24-28	29-30
Oil Consumption	17	15-17	15-16	14-16
Net (Imports) Exports				
Oil	(6)	(5) - (3)	(5) - (8)	(4) - (6)
Gas	(1)	(1)	(1)	(1)
Coal	1	1-2	2	3-4
Western Europe Total Energy	26	27-29	29-31	32-33
Non-oil Consumption	13	14-15	16-19	20-22
Oil Consumption	13	12-14	11-14	12-14
Net (Imports) Exports				
Oil	(11)	(9) - (10)	(8) - (11)	(7) - (11)
Gas	(1)	(1)	(1) - (2)	(2) - (3)
Coal	(1)	(1) - (2)	(2) - (3)	(4) - (5)
Japan Total Energy	7	8-10	9-13	11-14
Non-oil Consumption	2	3-4	4-6	6-9
Oil Consumption	5	5-7	4-7	4-6
Net (Imports) Exports				
Oil	(5)	(5) - (7)	(4) - (7)	(4) - (6)
Gas	(1)	(1)	(1)	(2)
Coal	(1)	(1)	(2) - (3)	(1) - (2)

<sup>1</sup> Assumptions: Economic growth rates vary widely among forecasts regarding time intervals and geographic regions. There exists a general consensus of Free World GNP growth of approximately 3 percent per year from 1985 to 2000. Consensus price view assumes real oil price decline to 1985, rise thereafter by between 2-3 percent per year to 2000.

NOTE: A few extreme estimates were not included in the ranges. The WFO demand projections for 2000 and the high demand case in 1990, for example, imply an excess demand situation.

energy demand in the developing countries is expected to grow by 4-5 percent per year resulting in a sharp increase in their share of total energy demand. [REDACTED]

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### Oil Supply and Demand Projections

Forecasts of oil consumption in 1990 tend to cluster around 52 million b/d (range 50-53 million b/d) (Table 2). During the 1980s, increased oil consumption in LDC countries, particularly oil producing countries, is expected to offset further declines in oil consumption in the OECD countries from the 1980 level. In 1990, OECD oil consumption is expected to average 33-38 million b/d (35 million b/d mid-range) compared with 38 million b/d in 1980. Although oil's share of total energy is projected to decline, oil will continue to account for 40-50 percent of Free World Energy requirements throughout the period. During the 1980s, oil is expected to provide less than 15 percent of the total projected increase in energy demand. [REDACTED]

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World oil supplies are expected to increase less than 1 percent annually through 1990 with non-OPEC production capacity assumed to be fully utilized throughout the decade except in periods of excessive market weakness. All projections indicate that the Free World will remain dependent on OPEC oil for about half of oil requirements through the 1990s. Demand for OPEC oil is expected to climb from current levels of 18.5 million b/d to between 23-29 million b/d (27 million b/d mid-range) by the mid to late 1980s. As for the longer term, Free World oil consumption is projected to rise slowly during the 1990s amounting to 55-58 million b/d by 2000. Demand for OPEC oil is expected to range between 24-30 million b/d or roughly half of total Free World oil requirements. [REDACTED]

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### Assessing Forecasts

To derive a plausible range for 1990 estimates of oil consumption, we examined the critical assumptions used to arrive at the forecast estimates. In assessing these assumptions, we examined their reasonableness with respect to the other assumptions and compared them with historical results. Among the

\* Of the recent energy market forecasts available for comparison, including those of five major oil companies, a major consulting firm, and the US Department of Energy, we rejected only the OECD World Energy Outlook (WEO) high demand forecast for 1990 and the WEO high and low demand forecast for 2000. In each of these cases, the forecast projects excess demand for oil rather than arriving at a market clearing solution by allowing prices to rise. While consumption could rise to this level based on the assumption of constant real prices, constraints on productive capacity make this result improbable.



Table 2  
Free World Oil Supply and Demand 1990

Mid Range Forecast<sup>1</sup>

(million b/d)

										<u>(Key Assumptions)</u>	
<u>Total</u>	<u>OECD</u>		<u>United States</u>		<u>Western Europe</u>		<u>Japan</u>		<u>Non-Communists</u>	<u>Oil</u>	<u>Average</u>
	<u>Consumption</u>	<u>Production</u>	<u>Consumption</u>	<u>Production</u>	<u>Consumption</u>	<u>Production</u>	<u>Consumption</u>	<u>Production</u>	<u>Exports (Imports)</u>		<u>Annual</u>
52	35	14	16	9	12	3	6	-	0	37	3.1

1. Based on available forecasts.  
2. OPEC benchmark price per barrel in 1981 dollars.

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key assumptions examined were price paths, economic growth, elasticities, and productive capacity. [REDACTED]

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### Prices

Most of the energy supply/demand projections from which we derived this range of forecasts assume flat or declining real oil prices to the mid 1980s, with prices rising thereafter by 2-3 percent per year in real terms through 2000. On balance, these price paths seem reasonable and are consistent with other elements in the forecasts. The benchmark OPEC oil price assumed in these forecasts for 1990 range from \$34-40 per barrel in constant 1981 dollars (Table 3). Price assumptions for 2000 range from \$43-54 per barrel (1981 dollars). Other energy prices are also assumed to increase; coal prices, for example, are expected to rise but remain competitive with oil. Natural gas prices are expected to move upward; the level of gas prices relative to oil will vary depending on the region. [REDACTED]

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While crude oil prices are projected to increase by 2-3 percent annually in real terms after 1985, forecasters are quick to point out that this price path may not be a smooth one. Real oil prices increased over 800 percent between 1970 and 1980; between 1974 and 1978, however, real prices actually declined about 8 percent. Some earlier forecasts assumed real prices would rise at a 5 percent annual rate. Recent changes in energy consumption patterns suggest that such a price path is more likely to result from a supply disruption rather than continued growth in oil consumption. [REDACTED]

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Because crude oil prices are denominated in dollars, currency fluctuations will also influence real oil costs and consumption trends in oil importing countries. The rapid appreciation of the dollar versus other currencies in 1980 and 1981 pushed oil costs up in foreign countries faster than energy prices. From October 1981 to early 1982, dollar appreciation raised the effective costs of crude oil by the equivalent of \$4 for France and Italy, almost \$2 for Japan, and \$1 for West Germany. The direction and magnitude of the impact of future fluctuations in currencies is difficult to predict. [REDACTED]

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### Growth

Growth assumptions are critical in forecasting long term energy supply and demand levels because a small change in the annual GNP growth over the period causes a substantial change in energy requirements. One forecast estimates that a one percent change in annual GNP growth during the 1980s would cause a 8 million b/d oil equivalent change in Free World energy demand and a 2.4 million b/d change in oil consumption in 1990. [REDACTED]

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Free World GNP growth of 3.1 percent annually during the 1980s is the consensus view of the forecasts we used to identify a cluster case projection. The OECD countries are expected to

Key Assumptions of Forecasts

	Free World Economic Growth Average Annual Percent Change 1980-2000	Oil Price (OPEC Benchmark) 1981 \$ per barrel		
		1985	1990	2000
Firm A	3	32.50	35.90-37.70	43.75-50.65
Firm B	NA	34.50	37.15	43.15
Firm C	3.2 <sup>1</sup>	34.50-35.50	36.95-39.95	45.95-53.70
Firm D	3			
WTO High	3.2 <sup>2</sup>	28.00	28.00	28.00
WTO Low	2.6 <sup>2</sup>	29.00	33.60	43.35
Firm E	3	34.00	35.05	NA
Firm F	3.2	29.10	40.14	47.65

<sup>1</sup> World  
<sup>2</sup> OECD

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[redacted]

show average growth during the period of about 2.7 percent while oil exporting and developing country growth rates are assumed to increase 4-5 percent annually. Given last year's economic record and expectations for 1982, GNP growth in the OECD would have to average 3.1 percent annually during the balance of the decade to achieve the 2.7 percent average for the 1980s as a whole. [redacted]

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The consensus view from the available forecasts for 1990 Free World energy consumption imply continued sharp energy efficiency gains. With energy consumption expected to grow at an average annual rate of 2.2 percent, energy efficiency measured as the amount of energy (Btu) needed to produce one unit of GNP is expected to fall by about 3 percent during the decade. This may be on the low side; during the 1970s energy use per unit of GNP fell by almost 14 percent. The slowdown in efficiency gains implied for the 1980s may reflect the much smaller rise in oil prices forecast for the period than occurred during the 1970s. The rate of change in the capital stock turnover may also slow during the balance of the decade in the absence of further sharp increases in prices. [redacted]

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The assumption of 3 percent average annual growth in free world GNP used is a reasonable central case. Actual growth of course could be appreciably different. A reasonable upper range estimate might be a four percent rate for the 1980s. This would be roughly consistent with the rate of economic growth achieved during the 1970s, and would require rates of growth averaging 4.4% during the balance of the 1980s. Although this may not have a high probability of materializing, it could constitute a reasonable outer bound. A two percent annual rate is a reasonable low case for the 1980s. [redacted]

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Another factor which could cause differences in oil consumption during any period up to 1990 is the business cycle. Even if GNP growth averages 3 percent annually over the period, there would likely be sharp variations from year to year which, in turn, would cause differences in the level of energy and oil demand. The observed annual growth pattern in OECD countries over the course of the most recent business cycle (1976-81) yields an average growth rate of about 2.7 percent although year to year variations range from 4.9 percent in 1976 to 1.3 percent last year. Replicating these year to year growth patterns through 1990 yields a difference of as much as 2.3 million b/d oil equivalent in energy consumption in certain years as opposed to using a smooth 2.7 percent growth rate each year. In both cases, 1990 energy consumption is the same. [redacted]

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### Price Elasticities

The responsiveness of oil or energy demand to a change in price is a key factor in determining the ultimate level of demand and the price needed to clear the market. There is almost unanimous agreement among forecasters that the demand for oil and energy is inelastic--relatively unresponsive to price changes--in

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the short term. Over the longer term, it is generally agreed that demand becomes more responsive to changes in price although it remains relatively inelastic. [REDACTED]

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Most forecasters disagree on the magnitude of the price elasticity for oil and the rate of change over time. Estimates of the first-year end use oil price elasticities taken from a variety of energy forecasts range from .1 to .3. The lower estimate implies, for example, that a real price change of 10 percent is needed to induce a one percent change in consumption. The higher figure implies a 10 percent real price change is needed to change consumption by 3 percent. Estimates of the long run elasticity of demand for oil are in the range of .35 to .8. All estimates of demand elasticities used in the forecasts evaluated in this study fall within the above ranges.

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The supply response to changes in prices is also a major factor in assessing the level of future energy/oil production and price levels. There are no generally agreed upon estimates of supply elasticities and many forecasters assume that supply levels are given based on their estimates of existing and planned levels of capacity. Most observers agree that oil supply is less responsive to changes in price than demand, at least in the medium term--given government policies and the time lags involved in finding and developing new reserves. Anticipated levels of price and demand are major factors influencing future supply availability. In some countries, expected revenue needs influence the level of capacity. [REDACTED]

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#### Productive Capacity

Based on the midpoint of the consensus range of forecasts, estimated Free World oil productive capacity is expected to average about 56-57 million b/d during the late 1980s (Table 4). Taking everything together, this is a reasonable estimate. If prices remain weak in the next few years, we would not rule out the possibility of some erosion in productive capacity. Alternatively, if prices were to increase sharply later in the decade it would have a positive affect in capacity patterns. Given the lead times involved, however, the impact is not likely to be felt until the early 1990s. [REDACTED]

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#### OPEC Capacity

OPEC oil productive capacity estimates of 32.5-33.5 million b/d fall close to the midpoint of the range for maximum sustainable capacity (MSC). Maximum sustainable capacity is the maximum production rate that can be sustained for several months; it considers the experience of operating the total system--including downtime for maintenance and repair and weather--and is generally some 90-95 percent of installed capacity. MSC may also be restricted because of limitations on the ability of the system to gather, process or transport crude at any point in the

Table 4

Non-Communist World: Productive Capacity<sup>1</sup>

(million b/d)

	<u>1985</u>	<u>1990</u>
<u>OPEC</u>	33.5	32.5
Persian Gulf	23.7	23.4
Saudi Arabia	10.7	10.7
Iran	4.0	3.5
Iraq	4.0	4.5
Kuwait	1.6	1.5
UAE	2.2	2.1
Qatar	0.7	0.7
Neutral Zone	0.5	0.4
Other OPEC	9.8	9.1
Algeria	1.1	0.9
Libya	2.2	2.4
Nigeria	2.0	1.9
Venezuela	2.4	2.2
Ecuador	0.2	0.2
Indonesia	1.7	1.4
Gabon	0.2	0.1
<u>Non-OPEC</u>	23.5	23.5
United States	9.8	9.5
Mexico	4.0	4.5
North Sea	3.2	3.2
Egypt	0.7	0.8
Other	5.8	5.5
<u>Total</u>	57.0	56.0

<sup>1</sup> Including natural gas liquids. Estimates are based on the midpoint of the consensus range of forecasts for maximum sustainable capacity. Capacity estimates for Kuwait and the UAE are based on the assumption that these two countries will continue to be reluctant to produce at MSC even during a crisis, although they will be willing to boost output above the self-imposed ceilings which would prevail in the absence of a disruption.

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system. The concept of MSC usually attempts to reflect the maximum production rate sustainable without damage to the fields. Output may exceed MSC by small amounts for short periods, but only at the risk of damage to the fields and/or surface facilities. Allowances have been made for Kuwait and the United Arab Emirates because they have demonstrated a reluctance to increase output to maximum levels. Available forecasts indicate OPEC capacity will likely hold at about 30-33 million b/d through 2000. This assumes productive capacity in Iran and Iraq combined returns to 8 million b/d or only slightly below levels existing prior to the Iranian revolution. This seems plausible under the existing regimes in both countries. In one extreme case, however, a major oil company projects a steady expansion of OPEC maximum sustainable capacity, reaching a level of 42.5 million b/d in 2000, with available capacity projected at about 31-32 million b/d. This extreme estimate of sustainable capacity appears highly optimistic, however, given the stated intentions of certain OPEC members such as Saudi Arabia and Kuwait. [REDACTED]

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#### Non-OPEC Capacity

Non-OPEC productive capacity was estimated from the midpoint of the consensus range for OECD and non-OPEC LDC oil supplies at about 23.5 million b/d. Except during periods of unusual weakness in the oil market, non-OPEC producers will be operating at or near MSC. In the present weak market, about 700,000 b/d of surplus capacity exists in non-OPEC countries, a level that is assumed to be a reasonable maximum. The capacity estimates for the non-OPEC group were rounded upward to take into account the very small amounts of underutilized capacity that might exist in some areas. [REDACTED]

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In these forecasts for 1990, US oil production estimates range from 7.1 million b/d to 10 million b/d compared with actual production of 10.2 million in 1981. While US production has not risen in the wake of sharply higher prices, it has also not declined as many forecasters earlier predicted. Several knowledgeable industry sources, including prominent geologists, argue that there are insufficient reserves remaining to be discovered to sustain high levels of US production. Others argue that price incentives and the release of new acreage for exploration will provide enough new oil to keep output high. Synfuel output--viewed optimistically by several forecasters as a new source of supply just a few months ago--now appears to be dead for the remainder of this decade. [REDACTED]

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Projections of net Communist oil trade with the Free World in 1990 range from .5 million b/d net exports to 2 million b/d net imports. All forecasts point to a continued decline in net Communist exports to the West. In addition to the level of Soviet oil production (not specified in most of these forecasts), a key factor in determining the level of Communist oil trade is the amount of natural gas that can be used to free up oil

supplies for export, especially from Eastern Europe. Even if Soviet oil production declines or stagnates as some observers expect, the export of oil could be maintained at fairly high levels through substitution of natural gas. The clustering of forecasts around a zero net Communist export level appears to be a reasonable assumption, but under a scenario of high oil prices, it is not inconceivable that net exports could be even higher than .5 million b/d through extensive gas substitution in Eastern Europe. [REDACTED]

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### Interfuel Substitution

Most forecasts do not explicitly treat the potential for interfuel substitution citing only assumptions about relative price levels and in some cases indicating where potential supply constraints may exist. Most of the estimates of coal and natural gas consumption are based on announced intentions to switch fuels, available supplies in each sector, and government policies toward fuel substitution where applicable. [REDACTED]

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### The Plausible NSSD Forecast Range in Brief

After eliminating those forecasts which appeared unrealistic because of assumptions used in their preparation, oil consumption estimates for 1990 range from a low of 50 million b/d to a high of 53 million b/d. While these forecasts represent a plausible range of oil consumption estimates, we believe the range is too narrow for a period 8 years in the future. [REDACTED]

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A critical examination of the assumptions indicates a need for a wider range in potential consumption.

- o The assumption of three percent annual growth, while reasonable, does not allow for potentially stronger or weaker growth during the decade. A high growth path of 4 percent per year and a low path of 2 percent average annual growth appear to be reasonable upper and lower bounds.
- o Year to year variations in growth due to the effects of the business cycle are not accounted for in these forecasts. Variability above and below the average growth for the period can account for sizable swings in energy consumption.
- o While 1990 estimates are given, the price path used to arrive at these estimates can give entirely different consumption figures along the way. Consumption in any one year may be higher than in 1990, particularly if the average increase in real prices assumed occurs in a one or two year period late in the decade.
- o The oil price path will also have a significant impact on the availability of non-oil supplies, especially



given the long lead times in developing the supplies and the ability to use them. Should oil prices remain weak early in the period, some non-oil supplies may not materialize.

- o Technological change as it relates to the use of oil and energy could sharply alter consumption patterns. While this factor is likely to cause a reduction in oil use, it is difficult to make a reasonable estimate of the magnitude. [REDACTED]

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On balance, we believe a plausible range of oil consumption estimates for 1990 could be 48 to 55 million b/d after considering the potential for variability in economic growth, the impact of the business cycle, potential price paths, and non-oil supply availability. (Tables 5 and 6) Consumption at the high end of the range would likely push oil prices up to about the \$40 per barrel level in constant \$1980. For this, to occur, OPEC would have to follow a pricing behavior pattern quite dissimilar to the 1970s. For a variety of reasons, this may be plausible. OPEC members may have become concerned that the recent price runup which forced sharp production cutbacks on all members was too damaging to risk repeating. Some form of an OPEC long term pricing agreement may be reached later this decade which also could alter their pricing behavior. Moreover, political changes in key producing countries may alter pricing behavior or the character of OPEC as a cohesive group. [REDACTED]

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#### Near Term Outlook

All forecasts agree that the oil market will remain soft over the next three to four years with consumption growing only slowly and capacity sufficient to handle even a moderate oil supply disruption. Altogether most baseline projections visualize Free World oil demand ~~rising to about 46 million b/d~~ next year. Assuming a much more vigorous recovery than implied in these projections demand might rise as high as 47 million b/d. The highest 1984 demand levels we can visualize are in the 48-49 million b/d range, although this is an outer limit, not a best estimate. [REDACTED]

*falling stock  
at about 45-46  
million b/d*

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#### Implications for Energy Trade

The major industrialized countries, mainly Japan and Western Europe, are expected to remain heavily dependent on imported energy supplies, particularly oil, through the end of the century. Japan and Europe are expected to depend on imported energy for roughly 80 and 50 percent respectively of total energy requirements during the remainder of the century while the U.S. will import about 15 percent of total energy supplies. Although oil consumption is projected to hold fairly steady, oil imports are still expected to account for about one-third of European energy requirements in 1990 and 2000. Oil imports as a percent of Japanese energy requirements are expected to fall from about

Table 5

1990 Free World Oil Supply and Demand  
Plausible Range<sup>1</sup>

million b/d

<u>Total</u> <u>Consumption</u>	<u>OECD</u>		<u>United States</u>		<u>Western Europe</u>		<u>Japan</u>		<u>Rest of Free World</u>	
	<u>Consumption</u>	<u>Production</u>	<u>Consumption</u>	<u>Production</u>	<u>Consumption</u>	<u>Production</u>	<u>Consumption</u>	<u>Production</u>	<u>Consumption</u>	<u>Production</u>
48-55	32-38	12-16	14-17	7-10	11-14	3-4	4-6	-	14-19	31-41

1. Based on range of available forecasts adjusted for higher or lower growth path.

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Table 6

The NSSD Free World Oil Forecast<sup>1</sup>

	Low		Medium		High	
	<u>1985</u>	<u>1990</u>	<u>1985</u>	<u>1990</u>	<u>1985</u>	<u>1990</u>
Oil Consumption million b/d	47	48	49	52	51	55
GNP Annual Growth	2 percent		3.2 percent		4 percent	
Oil Price (1980 \$ per barrel)	26	31	26	37	26	41
Spare Capacity (million b/d)	10.7	7	8.6	4.6	7	2.8

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<sup>1</sup> These results represent the calibration of EIA's OMS model to the growth assumptions and oil demand estimates derived from the NSSD review of forecasts.

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60 percent in 1990 to 40 percent in 2000. Projections indicate that the US will depend on oil imports to meet roughly 15 percent of total energy needs in 1990 and 2000. The assessments on energy trade do not take into account any temporary demand surges associated with the business cycle or other factors. [REDACTED]

25X1

### Oil

Because OECD oil production is projected to remain relatively flat at about 14 to 16 million b/d in both 1990 and 2000, the expected drop in oil consumption results in a direct drop in OECD net oil imports from 23.5 million b/d in 1980 to about 20-23 million b/d in 1990 and 18-21 million b/d in 2000. Since both OECD oil consumption and oil imports decline at about the same rate, OECD dependence on oil imports as a fraction of oil consumption remains fairly stable at about 60 percent. Although US oil consumption is projected to decline from 17 million b/d in 1980 to 16 million b/d in 1990, net oil imports are expected to increase from 5.4 million b/d in 1981 to about 6 million b/d in 1990, as a result of a projected decline in domestic oil production. If production does not decline, imports would be about 5 million b/d. Projections on U.S. oil imports after 1990 vary from 4 to 6 million b/d due in part to the uncertainty about the contribution of synfuels to total production. [REDACTED]

25X1

### US Military Requirements in Peacetime

The US military peacetime oil requirements are expected to remain at about current levels of 400-500 thousand b/d through 1990. Roughly 60 percent of peacetime requirements are consumed in the United States. Most of the products consumed--about 64 percent--are produced in the United States. Since oil is consumed as refined products, sources of crude oil for refining varies within the region. [REDACTED]

25X1

### US Military Requirements by Region

(thousand b/d)

EUCOM	72
PACOM	75
LANTCOM	14
SOCOM	2
Southwest Asia/IO	21
CONOS and ALASKA	300
	<u>484</u>

### Sources of Oil Imports

Table 7 shows the sources of oil imports by region for 1981. Although no estimates are available for 1985 and beyond,

it is clear that OPEC will retain its position as the principal supplier of internationally traded oil. In 1981 some 20.5 million b/d or nearly 80 percent of the OECD's oil imports came from OPEC member countries and 12 million b/d or nearly 60 percent of the OECD's imports came from OPEC member countries. Saudi Arabia was the largest single external source of OECD oil supplies in 1981, followed by the U.A.E., Libya, Nigeria, Indonesia, and Venezuela. Saudi Arabia was also the largest single external source of oil supplies for each of the separate OECD countries and regions. [ ]

25X1

In 1981, Japan was most dependent on OPEC oil supplies followed by Western Europe, Australia-New Zealand, Canada and the United States. Western Europe and Japan were also considerably more dependent than the rest of the OECD on OPEC member countries as an external source of oil supply. While there has been considerable change in the mix of individual sources of oil supplies imported by OECD countries, the overall share of total oil imports from OPEC and OPEC sources has not changed significantly over time in most OECD countries. [ ]

25X1

### Natural Gas

Natural gas use is expected to remain about 20 percent of total energy through 2000. Total Free World gas consumption is projected to increase from about 17 million b/d oil equivalent in 1980 to 22 million b/d oil equivalent in 1990 and about 27 million b/d oil equivalent by 2000 (a growth rate of about 2 percent per year). Most projections indicate both Europe and Japan will experience a significant increase in natural gas consumption. During the 1980s, gas availability is expected to be limited by the lack of transportation and handling facilities. These factors will be less of a constraint in the 1990s. [ ]

25X1

Increased natural gas production is expected to occur primarily outside the traditional gas consuming countries. US gas production is projected to be supplemented by pipeline and LNG imports from Canada and Mexico but no major increase in the total volume of US imports is expected. Western European natural gas production is expected to hold fairly steady at about 3 million b/d oil equivalent to 1995 and decline thereafter to less than 3 million b/d oil equivalent by 2000. During the same period, Western European consumption is projected to increase from just under 4 million b/d oil equivalent in 1980 to about 5 million b/d oil equivalent by 2000. The resulting increase in natural gas imports, primarily from Africa and the USSR, will significantly increase Western Europe's vulnerability to disruptions in natural gas supplies. Japanese imports of LNG are expected to also increase substantially, more than doubling from less than 1 million b/d oil equivalent in 1980 to over 2 million b/d oil equivalent by the year 2000. Much of the incremental volumes will be provided by a number of relatively secure suppliers such as Australia and Canada. Demand for natural gas

is projected to also increase in Mexico and the OPEC nations where it will represent the only significant diversification away from oil use over the next two decades. [REDACTED]

25X1

### Coal

Free World coal consumption is projected to increase from 18 million b/d oil equivalent in 1980 to about 26 million b/d oil equivalent in 1990 and about 37 million b/d oil equivalent in 2000. This 3.5-4 percent annual gain will push coal's share of total energy from 20 percent in 1980 to about 25 percent by 2000. The strongest growth in production will occur in the U.S., followed by Australia, South Africa, and Canada. Coal's current price competitiveness will be maintained or increased in the late 1980s if the world once again experiences real oil price increases, and price will continue to be the determining factor in the expansion of trade in coal. The US will remain a large net exporter of coal, more than doubling current export volume by 2000. The LDCs and Communist countries will also increase their volume of coal exports. [REDACTED]

25X1

Coal trade in the OECD area is expected to grow considerably over the next two decades, with the largest absolute increases occurring after 1990. Total coal imports by OECD countries were nearly 3 million b/d oil equivalent in 1980, with intra-OECD coal trade accounting for all but 0.5 million b/d oil equivalent of the OECD's imports. Western Europe was the largest coal importer in 1980, followed by Japan and Canada. The U.S. was the largest coal exporter in the OECD in 1980, followed by Australia, Western Europe and Canada. The largest external source of OECD coal imports in 1980 was South Africa, followed by Poland and smaller quantities from the Soviet Union and others. [REDACTED]

25X1

Coal trade within Western Europe is expected to decline gradually over time and the bulk of the increase in Western European coal imports is projected to come from the U.S. and Australia, followed by a steady increase in imports from South Africa and new coal exporting countries, primarily Columbia. Western European imports of coal from Poland and the Soviet Union might increase by a relatively small amount. Japan's principal sources of coal imports in the future are likely to be Australia, the United States and Canada, with smaller amounts also supplied by South Africa, China and the Soviet Union. [REDACTED]

25X1

### Dependence on Oil Imports

The OECD countries as a group relied on OPEC countries for 16 million b/d last year--about 75 percent of total oil imports and 45 percent of consumption (Table 7). The industrial countries imported about 10 million b/d from Persian Gulf countries in 1981, including 7 million b/d alone from Saudi Arabia. Generally foreign countries, particularly Western Europe nations and Japan, rely more heavily on OPEC and Persian Gulf oil than the United States. NATO countries imported about 7 million

Table 7

**ESTIMATED OECD IMPORTS OF CRUDE OIL AND REFINED PRODUCTS**  
**1981**  
 (thousand b/d)

	<u>United States</u> <sup>1</sup>	<u>Canada</u>	<u>Japan</u>	<u>Western Europe</u>	<u>Other OECD</u>	<u>Total OECD</u>
Algeria	303	17	47	437	0	804
Bahrain *	0	0	27	4	14	45
Egypt	36	0	5	213	0	254
Iraq *	19	0	58	430	0	507
Yemen *	1	12	255	279	36	583
Libya	432	8	21	724	0	1,185
Qatar *	7	0	150	182	5	344
Saudi Arabia *	1,247	170	1,708	3,979	128	7,232
Syria	6	0	3	18	0	27
UAE *	197	3	581	449	17	1,247
<b>OAPEC</b>	<b>2,248</b>	<b>210</b>	<b>2,855</b>	<b>6,715</b>	<b>200</b>	<b>12,228</b>
Ecuador	49	0	26	1	0	76
Gabon	45	0	0	56	0	101
Indonesia	386	0	705	35	42	1,168
Iran *	4	0	135	343	0	482
Nigeria	672	4	21	483	0	1,180
Venezuela	594	147	47	373	0	1,161
<b>OPEC</b>	<b>3,956</b>	<b>361</b>	<b>3,754</b>	<b>7,771</b>	<b>228</b>	<b>16,070</b>
Canada	445	0	8	10	1	0
Mexico	555	58	72	290	0	975
Other <sup>2</sup>	984	148	781	2,049	65	3,185
<b>Total</b>	<b>5,982</b>	<b>567</b>	<b>4,650</b>	<b>10,355</b>	<b>308</b>	<b>20,556</b>
of which						
Persian Gulf countries	1,475	185	2,914	5,666	200	10,440
(Percent of total) (25)		(33)	(63)	(55)	(65)	(51)

1. Traced to source of crude.

2. Includes unknown.

\* Persian Gulf countries.

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b/d from Persian Gulf countries in 1981 or roughly 38 percent of total oil imports (Table 8). This reflects a drop in dependence on Persian Gulf oil from about 46 percent or 11.0 million b/d imported by all NATO countries in 1973. Price-induced conservation and increased domestic production, particularly in Western Europe, were key reasons for reduced dependence. [REDACTED]

25X1

Future oil import patterns are difficult to predict. Flows will depend in part on political developments and contractual arrangements. OPEC nations, however, are expected to provide about one-half of Free World oil consumption in 1990. Over thirty percent of Free World oil needs are expected to come from Middle East nations. Foreign countries are likely to continue to rely more heavily on Middle East oil than the United States. Increased imports from Mexico could hold down US imports from Persian Gulf countries, although a prolonged embargo of Libyan oil would require increased imports from the region. OECD as a group will likely rely on OPEC oil for roughly 10 million b/d, or half of total import requirements in 1990. The Persian Gulf is expected to supply 6-7 million b/d of the OPEC total. Persian Gulf countries will also remain a major oil supplier for NATO countries through 1990. Based on IEA projections of oil requirements in 1990, total NATO and NATO Western Europe will likely depend on Persian Gulf countries for about 40 percent of oil imports. [REDACTED]

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#### Historical Incidences of Disruptions

Since 1950, oil supplies from major exporting countries have been interrupted on 13 occasions. The duration of these disruptions ranged from one month (a 1977 fire at a Saudi Arabian gas-oil separation plant) to 44 months (nationalization of Iranian oil fields in 1951). Supply losses ranged from 300,000 b/d in the case of the 1976 Lebanese Civil War to, 3.7 million b/d as a result of the Iranian revolution in 1978-79. [REDACTED]

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In most cases, the disruption to supplies had little or no measureable impact on prices. Oil companies were able to switch to alternate sources with relative ease because of the ample surplus capacity that existed worldwide and the considerable flexibility companies maintained in their distribution systems. [REDACTED]

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Three oil disruptions--all since 1970--have had a significant market impact.

- o Libya's move to reduce foreign company production in 1970, coincident with pipeline sabotage in Syria resulted in a 25 percent rise in oil prices.
- o The 1973 Arab oil embargo supported a tripling of oil prices and contributed to an abrupt curtailment of GNP growth.



NATO Dependence on Persian Gulf Oil, 1981  
(thousand b/d)

	<u>NATO</u>	<u>US</u>	<u>Canada</u>	<u>Western Europe (NATO)</u>	<u>Belgium Luxem- bourg</u>	<u>Denmark</u>	<u>France</u>	<u>Greece</u>	<u>Iceland<sup>a/</sup></u>	<u>Italy</u>
<b>Persian Gulf Countries</b>										
Bahrain	4	0	0	4	0	0	2	0	0	Neg <sup>1</sup>
Iraq	449	19	Neg1	430	1	0	46	23	0	15
Kuwait	289	1	12	276	6	1	25	2	0	40
Oman	186	7	0	179	10	0	52	0	0	33
Saudi Arabia	5187	1247	170	3770	363	25	932	201	0	649
United Arab Emirates	610	197	3	410	0	3	145	0	0	45
Iran	333	0	0	333	22	0	29	13	0	56
Other Imports	11522	4511	382	6629	387	215	946	203	11	1147
Total Imports	18580	5982	567	12031	789	244	2177	442	11	2126
Gulf Imports	7058	1471	185	5402	402	29	1231	239	0	979
As a Percent of Total Imports	38.0	24.6	32.7	44.9	51.0	11.9	56.5	54.1	0	46.0
Oil Consumption	28679	15983	1683	11013	459	243	2000	239	11	1873
Gulf Imports as a Percent of Consump- tion	24.6	9.2	11.0	49.1	b/	11.9	61.6	b/	0	52.3
Total Energy Consumption	63280	36280	4355	22645	1055	390	3780	340	Neg1	2900
Total Energy Imports	24540	6765	825	16950	1310	420	2542	490	Neg1	2665

<sup>a/</sup> Iceland imports products only.

<sup>b/</sup> Belgium, Greece, and the Netherlands export large quantities of refined products.

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NATO Dependence on Persian Gulf Oil, 1981 (continued)  
(thousand b/d)

	<u>Nether-</u> <u>lands</u>	<u>Norway</u>	<u>Portugal</u>	<u>Spain</u>	<u>Turkey</u>	<u>United</u> <u>Kingdom</u>	<u>West</u> <u>Germany</u>
<b>Persian Gulf Countries</b>							
Bahrain	2	0	Negl	0	0	Negl	0
Iraq	2	0	28	46	116	8	4
Kuwait	75	0	0	13	9	87	18
Qatar	47	0	0	30	0	1	6
Saudi Arabia	355	14	40	294	31	348	518
United Arab Emirates	25	3	21	52	0	44	72
Iran	10	0	13	101	34	25	30
Other Imports	894	103	78	518	82	405	1640
Total Imports	1410	120	180	1054	272	918	2288
Gulf Imports	516	17	102	536	190	513	648
As a Percent of Total Imports	36.6	14.2	56.7	50.9	69.9	55.9	28.3
Oil Consumption	715	190	176	990	299	1487	2331
Gulf Imports as a Percent of Con- sumption	b/	8.9	58.0	54.1	63.5	34.5	27.8
Total Energy Consumption	1495	485	220	1530	625	4070	5485
Total Energy Imports	1765	180	205	1160	275	1410	3720

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- o Supply losses resulting from the Iranian revolution contributed to a doubling of oil prices between late 1978 and early 1980.

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### Classes of Disruption

Given estimates of productive capacity and a low and high level of consumption we have examined 5 possible classes of disruptions of oil productive capacity:

- Class I a 16-17 million b/d loss in productive capacity, for example, closure of the Strait of Hormuz,
- Class II an 11 million b/d loss in productive capacity, such as a shutdown in Saudi Arabia,
- Class III a 7 million b/d loss in capacity associated with an event such as a major war in the Persian Gulf involving several countries,
- Class IV a 4 million b/d loss in capacity, and
- Class V a 2 million b/d loss in capacity.

In addition, the uncertainties that will confront the market at the start of any disruption are likely to play a major role in determining subsequent market reactions. Oil producers and consumers, for example, are unlikely to know, at least initially, either the size or duration of a disruption. These uncertainties are potentially very destabilizing and could lead to severe pressures to take actions which might later prove totally inappropriate. Moreover, specific conditions prevailing at the onset of a disruption--such as the level of commercial and strategic stocks, position in the business cycle, the level of international cooperation and political leadership abilities--can also have an important impact on the nature of the market reaction. Perceptions regarding the uncertainties which will probably surround most disruptions along with the specific environment in which the disruption takes place have the potential to turn even seemingly minor problems into major crises. Conversely, the reaction to major events of uncertain duration, can be limited under favorable circumstances.

25X1

### 1982-83

The Iranian invasion of Iraq and the repeated threats by the Khomeini regime against other Persian Gulf countries raises the distinct possibility that much of the present surplus in production capacity could be eroded. With current (third quarter) demand for oil at about 42-43 million b/d, surplus capacity totals about 10 million b/d an amount

sufficient to withstand Class III, Class IV, and Class V disruptions with no measurable impact on price (Table 9). [REDACTED]

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Sometime during the fourth quarter, however, demand is expected to rise by about 2-3 million b/d as excess inventories are worked off and companies return to normal stocking patterns. Events in the Middle East could alter the timing of the rebound in demand and recent evidence of increased OPEC production indicates that at least a temporary increase in demand is underway. [REDACTED]

25X1

Beyond stock behavior, economic growth patterns will also determine the level of oil demand. If the world remains in an economic slump, oil consumption is unlikely to rebound. A strong economic recovery during the fourth quarter, however, could add as much as 1 million b/d to oil demand. Under these circumstances, oil demand would rise to about 47 million b/d, reducing surplus production capacity to 6 million b/d. [REDACTED]

25X1

Even if the escalation of the Iran-Iraq war causes a loss of 3 million b/d in production capacity from the two countries the market would still have ample surplus capacity to offset a 4 million b/d disruption. The reduced capacity cushion, however, poses considerable risk.

- o Iranian intentions toward Persian Gulf supporters of Iraq could lead to attacks against key oil installations in these countries, resulting in a Class III disruption or larger with severe price pressures.
- o Fears of Iranian reprisals might cause the Saudis and Kuwait to keep production at or below present levels, effectively removing about 4 million b/d in surplus capacity from the market and again creating upward price pressures.

Regardless of developments in the Iran-Iraq war, a Class I or II disruption would result in a net supply shortfall under any reasonable assumptions about supply and demand. [REDACTED]

25X1

Disruption Scenarios

1982

(million b/d)

		Column 1	Column 2	Column 3	Column 4	Column 5
<u>Location and Type of Disruption</u>		<u>Total Free World Capacity</u>	<u>Disrupted Capacity</u>	<u>Available Capacity</u>	<u>Oil Demand</u>	<u>Net (Shortfall) or Surplus</u>
Class I	Closure of Straits of Hormuz	53	17	36	45	(9)
Class II	Saudi Arabia Shutdown	53	11	42	45	(3)
Class III	7 million b/d capacity loss Major war in Persian Gulf	53	7	46	45	1
Class IV	4 million b/d capacity loss	53	4	49	45	4
Class V	2 million b/d capacity loss	53	2	51	45	6

<sup>1</sup> Includes net Communist exports:

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25X1

1985

The excess in productive capacity of 6-9 million b/d projected for 1985 is sufficient to protect the market from all but major supply disruptions assuming all other producers are able to operate at or near capacity (Table 10). The oil market could absorb a 2-4 million b/d disruption--Class IV and V. A Class III type disruption of 7 million b/d, however, would eliminate most or all of the excess capacity. Even under the low demand, case a Class III disruption would leave only a 2 million b/d capacity surplus. A major disruption--Class I and II--would leave the oil market in a net shortfall position. A closure of the Strait of Hormuz, for example, would cause a 17 million b/d reduction in oil export capacity resulting in a net oil shortfall of 8-11 million b/d. [REDACTED]

25X1

1990

Surplus productive capacity is expected to erode later in the decade leaving the oil market increasingly vulnerable to supply disruptions. Estimates of available surplus capacity in 1990 range from about 1 million b/d under the high demand case to 8 million b/d under the low demand case. During the latter part of the decade oil demand is projected to rise while productive capacity is expected to remain stagnant. Realization of demand levels under the high demand case would leave the oil market vulnerable to even small supply disruptions of 1-2 million b/d--Class V (Table 11). Even if demand approximates the low end of the range the market would be protected from only moderate disruptions--Class IV and V. A Class III type disruption of 7 million b/d under the low demand case would wipe out almost all excess productive capacity. A Class I disruption such as a closure of the Straits of Hormuz would lead to a net oil supply shortfall of 8-15 million b/d. [REDACTED]

25X1

Table 10

Disruption Scenarios

1985

(million b/d)

		Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7
<u>Location and Type of Disruption</u>		<u>Total Free World Capacity</u>	<u>Disrupted Capacity</u>	<u>Available Capacity</u>	<u>Oil Demand Low</u>	<u>Oil Demand High</u>	<u>(Shortfall) Low Demand</u>	<u>Net or Surplus High Demand</u>
Class I	Closure of Straits of Hormuz	57	17	40	47	51	(7)	(11)
Class II	Saudi Arabia Shutdown	57	11	46	47	51	(1)	(5)
Class III	7 million b/d capacity loss Major war in Persian Gulf.	57	7	50	47	51	3	(1)
Class IV	4 million b/d capacity loss	57	4	53	47	51	6	2
Class V	2 million b/d capacity loss	57	2	55	47	51	8	4

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Disruption Scenarios.

1990

(million b/d)

		Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7
<u>Location and Type of Disruption</u>		<u>Total Free World Capacity</u>	<u>Disrupted Capacity</u>	<u>Available Capacity</u>	<u>Oil Demand Low</u>	<u>Oil Demand High</u>	<u>Net (Shortfall) or Surplus</u> <u>Low Demand</u> <u>High Demand</u>	
Class I	Closure of Straits of Hormuz	56	16	40	48	55	(8)	(15)
Class II	Saudi Arabia Shutdown	56	11	45	48	55	(3)	(10)
Class III	7 million b/d capacity loss Major war in Persian Gulf.	56	7	49	48	55	1	(6)
Class IV	4 million b/d capacity loss	56	4	52	48	55	4	(3)
Class V	2 million b/d capacity loss	56	2	54	48	55	6	(1)

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Sources of Disruptions

The recent escalation in hostilities in the Middle East have once again heightened fears of potential oil supply disruptions. The region accounted for about 40 percent of 1981 Free World oil production, and it contains numerous production and export facilities susceptible to damage from war or sabotage. Events during the Iran-Iraq war clearly illustrated the vulnerability of these facilities. Iranian attacks on the Iraqi export facility in the Persian Gulf, for example, eliminated 2 million b/d of Iraq's export potential. The following tabulation (Table 12) lists possible sources of disruptions that might be associated with the five categories of supply interruptions we have identified.

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Table 12

Selected Disruptions and Potential Causes

<u>Class</u>	<u>Event</u>	<u>Countries or Organizations Capable of the Action</u>	<u>Means of Disruption</u>	<u>Probability</u>
I	Threat to commercial shipping in Strait of Hormuz	Iran	Air or ground launched cruise missiles. Air or naval bombardment	Very Low
I	General war in the Persian Gulf	Iran/Persian Gulf littoral countries	Ground/air/sea attacks on production and export facilities	Low
I	Military closure of Strait of Hormuz	USSR	Air or naval emplaced mines	Very Low
I	Threat to commercial shipping in Strait of Hormuz	Most Persian Gulf countries	Air or naval attacks on tankers	Very Low
II	Iran-Iraq war widens to include Saudi Arabia and Kuwait	Iran	Naval and air bombardment Commando raid	Low
II	All Arab oil embargo of U.S., Japan and Western Europe	OAPEC states	Shut-in export production capacity	Low
II	Overthrow of the House of Saud	Internal Saudi elements aided by Iran	Military coup Massive civil unrest	Low
III	Iran-Iraq war intensifies	Iran/Syria Iraq	Sabotage to Turkish pipeline halts all Iraqi oil exports. Massive air attacks close Kharg Island	Medium

<u>Class</u>	<u>Event</u>	<u>Countries or Organizations Capable of the Action</u>	<u>Means of Disruption</u>	<u>Probability</u>
III	Destruction of key Saudi oil export facility	Iran PLO	Naval or air bombardment Commando raid Commando raid	Low
III	Arab oil embargo of U.S. only	OAPEC states led by Saudi Arabia	Shut-in production, strict destination restrictions/controls on all cargoes	Low
III	Interdiction of sea lines of communication around the Cape of Good Hope	South Africa	Naval/air interdiction, including use of cruise missiles	Very Low
IV	Overthrow of regime in Iraq	Internal elements possibly aided by Iran	Military coup Civil unrest	Medium
IV	Overthrow of regime in Iran	Internal elements aided by Iraq	Military coup Civil unrest	Low
IV	New Saudi oil policy established	N.A.	"Conservationist" elements limit production	Very Low
V	Iraq export pipelines completely closed	Iran/Syria Turkey	Political/military pressure forces Ankara to close Turkish pipeline	Medium-High
V	Overthrow of regime in Nigeria	Iran/Syria Internal Nigerian elements	Commando raid on pipeline Military coup Civil unrest	Very Low
V	Overthrow of regime in Indonesia	Indonesian internal elements aided by Vietnam	Military coup Civil unrest	Very Low

Table 13 presents a list of possible disruptions and estimates of their likely duration. The lower end of the range represents either the length of time the event might actually disrupt oil supplies or the amount of time that might pass before Western governments would be forced by political or economic conditions to intervene. The upper end of the range reflects a relatively optimistic time frame for repairs to restore at least a substantial portion of the disrupted supplies.

25X1

Selected Potential Disruptions by Class and Duration

	<u>Class</u>	<u>Likely Duration in months</u>	<u>Comments</u>
Closure of Strait of Hormuz	I	3-6	Could come about in a general war or a war between Iran and Gulf Arabs
All Arab Embargo of US, Western Europe and Japan	II	3-6	Most likely in the event of Arab Israeli War with the West supporting Israel.
Iran/Iraq War	II	3-12	Could occur if Saudi Arabia and Kuwait are drawn into Iran/Iraq conflict
Iran/Iraq War (full scale)	III	6-18	Limited conflict currently underway could become a Class II disruption if hostilities increase.
Destruction of Abqaiq processing complex, Saudi Arabia	III	3-24	Terrorist action, Islamic fundamentalists turmoil or spill-over from Iraq-Iran war could result in the damage or destruction of this facility.
Closure of both Ras Tanura and Ju'aymah, Saudi Arabia	III	3-24	Terrorist action or an Iranian attack as part of a widened Iraq-Iran war could close both of the Saudi Persian Gulf crude export terminals.
Iran/Iraq War (limited)	IV	6-24	Essentially the present conflict could recur during the decade.
Saudi Fundamentalist Regime	IV	12-indef.	A more conservative government in Saudi Arabia could establish a 6 mb/d production ceiling later in the decade.
Mexico-Civil Unrest	IV	3-12	Could come about with social-economic turmoil or Communist insurgency spillover into southern producing regions from Central America.
Iranian attacks on Kuwait oil facilities	V	6-12	Limited Iranian attacks on Kuwait facilities have already occurred.
Terrorist attack on Ju'aymah Terminal	V	6	Any radical group out to get attention could take out this terminal with little difficulty.

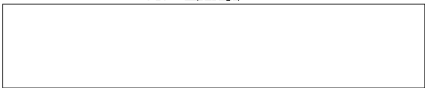
TOP SECRET

25X1

Selected Potential Disruptions by Class and Duration (Con't.)

	<u>Class</u>	<u>Likely Duration in months</u>	<u>Comments</u>
Egypt-Libya War	V	3-6	Could come about with Libyan subversion or indirect result of both countries supplying aid or troops to opposing sides in Iran-Iraq war.
Nigeria-Civil Unrest	V	1-6	Could come about with military coup of civilian government or north-south civil war.
Egypt-Civil Unrest	V	1-6	Could come about with social-economic turmoil, political coup, or fundamentalist-terrorist actions.
Terrorist Attacks on North Sea Platforms	V	1-24	Could come about from Irish extremists or other terrorists groups. If platforms totally destroyed would take 2 years or more to replace.

TOP SECRET



25X1

Risks of Disruption

Although the odds are against a major internal or external disruption in oil exports in any particular exporting nation or region the probability of some sort of disruption occurring is quite high. We cannot pinpoint with any accuracy where, when, or how severe such a disruption might be. All things considered, we believe the most secure sources of oil among the developing nations are Mexico, Venezuela and Indonesia. Saudi Arabia, the United Arab Emirates, and Nigeria would come next, not necessarily in that order. The least secure sources are Iraq, Iran, and in the near-term Kuwait, the latter because of the external threat posed by Iran. In the event of a large supply disruption, however, practically no source of oil and, therefore, no importing country is immune to the oil price increases which will result. Since a large proportion of the oil used by the non-Communist world will continue to be imported, the risks associated with a disruption will remain high for all consuming countries. [REDACTED]

25X1

Internal Stability of Key Free World Exporting Nations

The rapid pace of economic development over the past decade has set in motion forces likely to challenge the ability of the oil exporting states--and the more traditional Gulf states, in particular--to maintain internal stability. Popular discontent over the spread of corruption, the penetration of Western secularism and materialism, and the influx of foreigners is forcing the rich Gulf regimes to strike a delicate balance between conservatives, alarmed by the erosion in traditional values, and modernists interested in opening their political systems. Tehran's intention to foment unrest among the Gulf Shia communities--sizeable in Kuwait, Saudi Arabia, and Bahrain--will strain the continued ability of the Gulf security services to counter this threat. [REDACTED]

25X1

Internal stability during the remainder of the decade will also depend to some extent on the strength of the oil market. If demand stays at the lower end of the forecast range for the rest of the decade, oil revenues in the exporting countries will decline, perhaps sharply, in real terms during the next several years. In those countries where the populace has developed strong expectations of a rising standard of living, internal discontent could grow unless the central government is able to adequately manage the economy. On the other hand, financial constraints could provide an element of stability in those countries where the pace of development is viewed as too rapid. If demand approaches the higher end of the forecast range, revenues will probably increase. Although this could prove beneficial to some countries, allowing them to meet their growing financial requirements, for others it might only encourage growing waste and corruption which could result in increased dissatisfaction with government policies. [REDACTED]

25X1

The Persian Gulf

Saudi Arabia. Prospects for political stability in Saudi Arabia are good, but several potential problems exist. The government will need to move slowly on social and political reforms to avoid a backlash by Islamic fundamentalist forces that exist beneath the surface of Saudi society. Security services are being strengthened and a close watch maintained on the large foreign work force and the restive Shia population of the Eastern Province, which could become more assertive in the wake of an Iranian victory over Iraq. The royal family will also have to keep a check on factional rivalries in its own ranks that could weaken its control and undermine its authority. [REDACTED]

25X1

There are no indications of significant dissidence within the armed forces; the military was given an 80 percent pay raise last year. The complete separation between Army and National Guard establishments minimizes the likelihood of a successful coup. The government continues to strengthen its security forces, primarily in response to the perceived threat from foreign workers (about 2.5 million) and the minority Shia population (5 percent of the population). The foreign work force has so far proven more interested in money making than in political agitation. The large Yemeni component--now about 500,000--has been shrinking as demand for unskilled workers declines. The Shias who comprise 30 percent of the Aramco work force are presently quiet. [REDACTED]

25X1

The new King's quick appointment of Prince Abdallah--his half brother and long his chief rival within the family--as Crown Prince reflects Fahd's sensitivity to the need for family cohesion. Fahd also needs Abdallah because the Crown Prince commands support from constituencies where Fahd is weakest--Bedouin tribal leaders, social and religious conservatives and some important collateral branches of the royal family. Serious discord within the royal family is a danger if Fahd's position were to weaken as a result of policy failures. Even if the royal family were removed from power, this would not necessarily lead to a long-term disruption of oil exports, though at least a temporary disruption would seem likely. In the extreme, civil unrest could deprive the market of almost 11 million b/d of capacity for a time. A fundamentalist regime might restrict output, effectively eliminating 4-5 million b/d of available capacity. [REDACTED]

25X1

Iran. After three years of revolutionary chaos, the ruling clerical regime is now firmly in power. It has combined brutal repression with measures designed to maintain the loyalty of the lower classes. Even Khomeini's death is unlikely to threaten the regime's hold--although it may change aspects of its policies--in the foreseeable future. Over the longer term, the clerics will have to continue to demonstrate the capability to compromise among themselves. In either case the regime will have to deal with serious economic problems, particularly massive unemployment

and soaring inflation. Should the oil sector again be disrupted by political disturbances the market would lose as much as 4 million b/d of production capacity, economic problems will encourage continued relatively high levels of oil exports. Although it probably will be unable to dramatically improve conditions soon, Tehran will be able to muddle through without serious political threat for some time. [REDACTED]

25X1

Iraq. The defeats Iraq has suffered in its war with Iran have placed the current regime in Baghdad in jeopardy. Although President Saddam Hussein still apparently has firm control over the internal security apparatus, one reasonably likely near-term scenario would see removal of Saddam by a coalition of Baath Party and military men, followed by a period of instability, such as Iraq suffered in the decade following the overthrow of the monarchy. Instability would improve the chances that an Iranian-style Islamic fundamentalist government would eventually emerge in Baghdad, although on the whole a continuation of Baath military rule is more likely. Iraq's ability to export oil could be further disrupted, removing almost 1 million b/d of productive capacity over the near term or potentially as much as 4.0-4.5 million b/d in the 1985-90 period. Any successor regime--even an Islamic one--will need to resume exports, however, as soon as possible. [REDACTED]

25X1

Kuwait. Kuwait has experienced little organized dissidence to date. The government has bought off most potential dissidents by providing attractive incomes and social welfare. Although less liquid than other Persian Gulf states, Kuwait's large foreign exchange holdings give it flexibility to deal with economic problems that may emerge. The continued Iranian successes in the war against Iraq, and Iranian subversion, however, could inspire antigovernment activity by Shias who comprise 30 percent of the native population. Antigovernment activity that spread to the oil sector could disrupt more than 1.5 million b/d of available productive capacity. [REDACTED]

25X1

Other Persian Gulf. For its part, the UAE, a weak federation of shaykhdoms, has enjoyed relative stability. The Shia community is too small to pose a serious threat to UAE stability, but the large foreign population particularly Palestinians, is a potential threat despite the government's efforts to maintain good relations with Palestinian organizations and tighten controls over foreigners. Young UAE natives are seeking greater participation in the decisionmaking process, but no organized dissidence has been detected. Oman's prospects for political stability are good in the short term, organized dissidence has been minimal since Qaboos quashed a South Yemen-backed rebellion in 1975. Discontent is building, however, over the uneven distribution of wealth between urban areas and the impoverished interior, official corruption, and British influence, particularly in the armed forces. [REDACTED]

25X1

African Producers

Libya. The Qadhafi regime faces widespread and growing discontent, largely the result of Qadhafi's efforts to force his revolutionary ideas on an unwilling populace. These "reforms"--confiscation of second houses and of bank accounts, and universal military service, including the drafting of women--have thoroughly alienated the middle class, and spread disaffection into the ranks of the lower classes. Most important in terms of Qadhafi's future, the military seems to be disenchanted with Qadhafi's adventurism and with the "revolutionary" committees he has established on top of regular military ranks. There have been numerous coup and assassination attempts against Qadhafi by various military groups over the years, and the tempo of such attempts seems to be increasing. Should anti-Qadhafi activity spill over into the oil sector 2.0-2.5 million b/d of capacity could be disrupted. Qadhafi nevertheless possesses certain strengths including efficient intelligence and security services, and a good network of informers that have given him advance warning of coup attempts. [redacted]

25X1

Nigeria. Nigeria's relative political stability could deteriorate as the country's economic difficulties mount and political tensions associated with campaigning for the mid-1983 nationwide elections intensify. Because of the financial need to maintain oil exports it is unlikely this would result in an interruption in the flow of oil, should a disruption occur, however, it could remove about 2 million b/d of capacity from the market. During the next several years, barring a market disruption, any Nigerian government will have to balance the need to reduce expenditures--given oil price developments--and dampen economic expectations with political pressures and tribal sensitivities. This will almost certainly provoke political opposition among ethnic groups long denied a leading role in government. [redacted]

25X1

Algeria. Algeria's leadership is effectively balancing competing political interests, but increasingly active Islamic fundamentalists and the restive Berber community--twenty percent of the population--which feel threatened by President Chadli Bendjedid's Arabization program and are less favored economically, are potential sources of political instability. Disruptions in the oil sector could remove as much as 1 million b/d of capacity from the market. Bendjedid, however, has surprised the hierarchy of the National Liberation Front, Algeria's sole political party, with his skill in neutralizing potential rivals and is expected to retain the military's support for the indefinite future. [redacted]

25X1

Other Producers

Mexico. Internal and external threats to Mexican stability have been minimal for more than fifty years. The ruling party's control defies challenge over the short term but the economic and



social tensions growing out of Mexico's severe economic difficulties may become more difficult to manage. Burdened by a large external debt and a slowdown in the growth of oil exports, Mexico's economic growth will fall sharply for the next two years, and probably remain below normal for the remainder of the 1980s. The next administration, which takes office this winter, will also find it more difficult to sustain subsidies and political rewards on a basis commensurate with those of the past four years, when economic growth exceeded 8 percent annually. In these circumstances, balancing the conflicting goals of reducing poverty and unemployment while lowering inflation and maintaining middle class consumption patterns will become much more difficult. Strikes, student demonstrations, and consumer protests are likely. In the unlikely event such activity were to spread to the oil sector more than 4 million b/d of capacity could be disrupted after 1985. The Mexicans, however, have an excellent track record for containing disturbances. [REDACTED]

25X1

Venezuela. The Venezuelan democratic system shows no signs of internal instability and seems capable of weathering the economic pressures likely to grow during the decade. Most Venezuelans believe they have derived some benefit from the five-fold increase in oil revenues since 1973; the government has greatly increased social spending. In any event, the Venezuelan oil system is more immune to disruption than that of most other major oil exporters. Most of the oil is drawn from 6,000-7,000 widely dispersed wells; oil is exported from seven ports. The world oil market could lose as much as 2.5 million b/d of capacity if Venezuelan oil flows were disrupted. Even during the widespread civil violence of the 1960's, however, insurgents made no serious attempts to sabotage oil facilities for fear of discrediting themselves among the populace. [REDACTED]

25X1

Indonesia. The Indonesian government will be faced with growing political and economic pressures through the decade. Hostility between the volatile, indigenous Indonesians and the large and often wealthy ethnic Chinese is on the rise as is popular resentment against the government, military, and business elite. By 1986 the current leadership will have been in power for 20 years, and there is still no clear cut plan for succession. On the economic front a labor force growing much more rapidly than the number of jobs available and the continuing exodus of youth from the farms to the cities point to continuing problems. Still, the military appears capable of dealing with the internal disturbances--probably mainly urban riots--that occur. As much as 1.7 million b/d of capacity might be disrupted if widespread violence were to permeate the oil sector. [REDACTED]

25X1

Egypt. Egypt faces enormous economic and social problems that are likely to cause increased unrest in the 1980s. Population pressures are mounting, the costs of improving the quality of life are growing, and economic growth prospects are limited. Fed by economic and social distress, radical Islamic

groups have made significant progress in recruiting new followers among the young, especially students and members of the urban lower classes. On the other side of the political spectrum, many in the Egyptian intelligentsia remain loyal to the leftist ideology of former President Nasir and are disillusioned with the regime's pro-Western policies. Regional problems, in particular, the failure of the Camp David peace process so far to resolve the Palestinian problem, strengthen radical forces on both the left and right who have always opposed the peace treaty with Israel. Although only a small exporter, disruptions could result in the shutdown of as much as 800,000 b/d by 1990. [REDACTED]

25X1

### External Threats

Soviet Threat, Intentions, and Capabilities in the Middle East. The Near East is vitally important to the USSR because of its oil, its proximity, both to the USSR and important sea lanes, and the vulnerability of key Western interests. The primary strategic objectives of the Soviet Union in the region are the enhancement of its political and military influence at US/Western expense for defensive as well as offensive purposes; in the Persian Gulf, the Soviets will take advantage of opportunities to gain leverage over the oil supply from the Persian Gulf oilfields to Europe, Japan, and the United States. The USSR wants to gain recognition as a major player and eventually become the predominant outside power in the region's affairs. Moscow aims to augment its strategic reach, counter Western military activity, and forestall any Western threat to the USSR from the region. Finally, Moscow wants to increase its hard currency earnings as well as promote Soviet political and strategic interests through arms sales. [REDACTED]

25X1

Local conflicts and instability have served as principal avenues for the expansion of Soviet influence in the Near East. The Arab-Israeli dispute has been the most prominent among these exploitable conflicts; others actually or potentially include those between Iran and Iraq; Libya and Egypt; Morocco and Algeria; and South Yemen and Oman. The Soviets have taken advantage of the Arab-Israeli conflict to develop arms supply links with a number of Arab states, and have sought to use the dispute to isolate the US with Israel while aligning the USSR with the Arabs. Increasingly institutionalized Soviet-Syrian military ties are a major product of this process. The Arab-Israeli conflict has also served to limit the degree of influence the United States can bring to bear in countering Soviet exploitation of other area problems or disputes. [REDACTED]

25X1

In recent years, the Soviets have devoted increasing attention to the Arabian Peninsula and the Persian Gulf. The revolution in Iran, the Soviet invasion of Afghanistan, the war between Iran and Iraq, and the appearance of pro-Soviet client states in South Yemen and Ethiopia have improved Soviet prospects in the area. Since the Shah's fall, the Soviets have

tried to prevent a resurgence of Western influence in Iran while promoting Soviet influence over the long term. Moscow's progress to date has been mixed but improving: Soviet-Iranian economic ties have increased and Iran remains anti-US in orientation. Still, the Khomeini regime remains deeply suspicious of the USSR. Indeed, concurrent with growing overt ties, Moscow is actively pursuing a variety of covert activities to manipulate political forces, develop clandestine assets, and influence events in Iran. [REDACTED]

25X1

Continued Iranian action against the current Iraqi regime would not necessarily open the door to increased Soviet influence in Tehran. A protracted conflict would, however, be a source of instability that could enhance Soviet opportunities to influence both Iran and Iraq.

- o There is little practical need for Tehran to move more rapidly toward improved relations with Moscow.
- o The present Iranian regime's view of its military needs are far more modest than were the Shah's. To the degree that Iran decides to resupply, numerous foreign sources will be cultivated to avoid dependence on any one bloc for arms. Historical ties between Iraq and the Soviet Union and Moscow's announced objections to an Iranian invasion of Iraq could discourage Iran from becoming dependent on Soviet aid. An Iranian invasion that brought about the fall of Saddam Hussein would strengthen clerical rule in Tehran and make Iran even less susceptible to Soviet inroads. [REDACTED]

25X1

Several developments could lead the Soviets to consider invading Iran, including the seizure of power by a leftist coalition seeking Soviet assistance or the collapse of the government in Tehran with no clear successor regime. Moscow might invade not only because of opportunism and recognition of Iran's strategic importance, but out of fear that prolonged chaos or civil war would create security problems on the USSR's border, or desire to forestall a possible US military move into Iran. [REDACTED]

25X1

The Soviets have contingency plans for the seizure of key facilities and strategic areas in the Persian Gulf and undoubtedly have considered the possibility of encountering US ground forces in the region. The extent of the disruption to oil supplies would depend on the nature of the Soviet military move. Several million b/d of oil supplies could be lost if the disruption were confined to only one of the larger exporters in the Persian Gulf. As much as 17 million b/d might be unavailable to the market if a widespread conflict engulfed the region or the Soviets attempted to interdict traffic through the Strait of Hormuz. Although the balance of forces in the area favors the USSR, there are major political and military disincentives for a

Soviet invasion of Iran. Such a direct challenge to vital Western oil interests would represent a radical shift in Soviet foreign policy toward the West. [REDACTED]

25X1

Soviet aggression in Afghanistan presents a continuing threat to both Pakistan and Iran. Continued Soviet political and surrogate military pressure on Pakistan is likely, as Moscow believes that aid from Pakistan--and to a lesser extent Iran--is important to the resistance. Moscow, however, is probably unwilling to bear the very substantial cost of seizing border areas of Pakistan, much less a full scale invasion. Even should Moscow decide to go into Pakistan, there would probably be no short term affect on oil supplies. Such a move would undoubtedly heighten fears among the Persian Gulf oil producing states, including Iran, and might serve as a catalyst for increased cooperation between these countries and the West, particularly the United States. [REDACTED]

25X1

The greatest single constraint on Soviet expansionism in the Middle East is Moscow's interest in avoiding a military confrontation with the United States, whether in the region or elsewhere. A keen appreciation of this risk has tempered the Soviet Union's military behavior during the past three Middle East wars, and has led it to adopt a cautious policy toward direct exploitation of the upheaval in Iran. Other lesser constraints on military expansion include: limitations on Soviet airlift capabilities; a desire to avoid damage to relations in the Third World and greater cohesion of the US, Western Europe, and China. The most significant barriers to the spread of Soviet political influence have been local nationalism and Islam's traditional abhorrence of Communism. [REDACTED]

25X1

In the purely military sense, Soviet capabilities for projection of power into the petroleum producing areas have been enhanced by its occupation of Afghanistan and the evaporation of the US position in Iran. The unwillingness of most moderate Arab states to engage in serious contingency planning with the US--a result of the continuing Arab-Israeli problem and suspicions about US will and capability to confront the Soviets--also enhances the Soviet position. [REDACTED]

25X1

The USSR is likely to step up efforts to cultivate improved relations with the conservative Persian Gulf states as well as the more radical states, and to seek to promote West European acceptance of the legitimacy of the Soviet role in the Gulf. The Soviet approach could include more aggressive pursuit of arms sales or cooperative deals, both to buy influence and gain hard currency. [REDACTED]

25X1

The USSR has and will continue to become more involved in support of dissident groups such as local communist and leftist groups like the Iranian Tudeh Party. Soviet willingness to encourage and support such subversion and insurgency under the

right circumstances was demonstrated by its backing of South Yemen's decade-long efforts to overthrow the regime of Sultan Qaboos in Oman, using the Popular Front for the Liberation of Oman as its vehicle. We believe that the Soviets will use the threat of increased support for insurgent groups either to push regional governments to accommodate Soviet interests or possibly to topple existing governments. [REDACTED]

25X1

An increased Soviet political/military presence in the Middle East would not necessarily mean a reduction in oil supplies available to the non-Communist world. It could even, under certain circumstances, result in increased supplies. The Soviet presence would, however, increase the threat to Western energy security by augmenting Soviet influence and control over oil supplies and raising the spectre of politically motivated disruptions. [REDACTED]

25X1

Iranian Threat, Intentions, and Capabilities in the Middle East. Iran's new clerical leaders, like most successful revolutionaries, believe their own experience has universal validity. They actively seek to export their revolution throughout the Islamic world--starting with the Persian Gulf. Indeed, the moderate Arab regimes perceive Iran as a growing threat. They recognize that success of the Iranian revolution stands as a model for others intent on overthrowing their own regimes under the banner of Islamic resurgence. [REDACTED]

25X1

The Iranian regime, under siege in the summer of 1981, has been gradually consolidating its control. The ruling clerics, firmly in power for the foreseeable future even after Ayatollah Khomeini dies, are factionalized, but they agree on the principle of clerical dominance. They differ, however, on Iran's role in exporting the revolution. [REDACTED]

25X1

Iran's probable emergence as victor in its war with Iraq is likely to lead to greater instability throughout the Persian Gulf region. The Khomeini regime has a variety of options in pursuing its objectives: subversion, threats, diplomacy, and possibly military action. Iran, by virtue of its population, resources, and historical ambitions, can be expected to turn its attention increasingly to the Gulf after the war to assert its dominance there.

- o Tehran will intensify its efforts to replace moderate, pro-Western Gulf regimes with Islamic governments on the Iranian model.
- o Iran probably will use a combination of subversion, diplomacy, and the threat of military action rather than military action itself.
- o Kuwait appears particularly threatened. Less than 100 miles from the fighting, it repeatedly has been

threatened with retaliation by Iran for its financial and logistical support to Iraq. Iran even launched three warning airstrikes against Kuwait, including an attack on a gas-oil separation plant last year. Kuwait's weak defenses leave it extremely vulnerable to future attacks.

Iranian subversion and military activity in the Gulf could potentially disrupt as much as 17 million b/d in the unlikely event that shipping through the Strait of Hormuz was threatened. If Iranian activity threatened exports from only one or several countries, the size of the disruption could be as small as a couple hundred thousand b/d. [REDACTED]

25X1

How much Iran's internal problems will act as a constraint on its actions in the Persian Gulf region is uncertain. But the temptation to champion the cause of revolution in the Gulf--whether out of conviction or political expediency--probably will prove irresistible to the Iranian clerics. The Iranians probably are convinced they can exploit the same popular grievances against corruption and the spread of Western, secular influences in the Gulf that led to the downfall of the Shah. The Iranians have already made one effort to overthrow Bahrain's government--last December, using Shia dissidents. They will continue to train, arm, and finance other Gulf revolutionaries sympathetic to Iran's fundamentalist ideology. [REDACTED]

25X1

The immediate reactions of the conservative Gulf regimes have been to seek security by strengthening ties among themselves and with Egypt in order to help counter the Iranian threat. Although these may also seek discreet security assistance from the West to counter renewed Iranian-inspired Shia subversion--the most likely short-term threat--they may ultimately conclude that a conspicuous Western connection will merely serve to exacerbate this threat. [REDACTED]

25X1

The Arab-Israeli Conflict. The Arab-Israeli conflict will continue to be a major source of regional instability. Moreover, the Arabs will increasingly link its resolution, particularly as it pertains to the Palestinians, with their willingness to cooperate with the United States on other regional issues. The Arab oil producers implicitly, and sometimes explicitly, brandish the possible use of the "oil weapon" in the event the US goes too far in their view in supporting Israel. The size of the disruption resulting from an Arab oil embargo would depend on which countries participated, length of time the embargo continued and size of any production cutbacks implemented in conjunction with the embargo. [REDACTED]

25X1

There is also a possibility that radical Arabs will strike out at moderate Arab regimes--including the oil states and their oil facilities--for what the radicals perceive as inadequate support for their cause. The Arabs' defeat in Lebanon could

undermine the legitimacy of moderate regimes, embitter and embolden Palestinian radicals and lead to an upsurge in fundamentalist activity. Again, Kuwait is vulnerable because of its large Palestinian and Shia populations. [REDACTED]

25X1

The Begin government is determined to pursue an aggressive West Bank and Gaza settlements policy to entrench the Israeli presence and to promote an alternative West Bank leadership having no links to the Palestine Liberation Organization. Even if Begin were to depart, a successor Likud-led government would likely pursue a similar policy, guaranteeing that there will be sporadic outbreaks of serious violence in the Israeli-occupied territories. [REDACTED]

25X1

At present, the greatest risk of a major Arab-Israeli conflict, however, will come from continuing Israeli military presence in Lebanon. Even beyond the current situation the risk is great that skirmishes, crises, and limited military confrontations between Israel and Syria and the Palestinians will lead to conflict that could spread beyond Lebanon's borders. Instability in Lebanon is likely to continue with no prospects of an early breakthrough in the effort to recreate an effective central authority. [REDACTED]

25X1

Even if a strong Lebanese government does come to power and the Palestinians are disbursed to several countries, a more radicalized Palestinian movement could emerge. No matter where the PLO ends up, Arafat will have trouble maintaining control over its political and military remnants and its more radical elements. Such a movement might seek to destabilize the moderate oil producers, possibly in conjunction with fundamentalist groups and/or Iran. Reduced access to targets in Israel might even prompt attacks against Persian Gulf oil facilities as a means of demonstrating opposition to continued support for Israel by the West, particularly the United States. Depending on the targets selected and the amount of damage inflicted several million b/d of capacity could be disrupted. [REDACTED]

25X1

Libya and the Tripartite Alliance. Libya under Qadhafi will continue to promote regional instability. Setbacks and censure are unlikely to persuade Qadhafi to revise his grandiose aims, which include restructuring society worldwide on the Libyan model. The formation, with Soviet encouragement, of the "tripartite alliance" of Libya, Ethiopia, and South Yemen in August 1981 has enlisted allies in Qadhafi's subversive drive against key regional targets. [REDACTED]

25X1

Although Qadhafi's incessant subversive activity has been almost completely unsuccessful, he has had an impact out of proportion to his accomplishments. Other leaders assume that he will stop at nothing, from armed intervention to plotting their deaths. Operating with Ethiopia and South Yemen, Qadhafi will continue to focus on area states that cooperate with the US.

Primary targets at the moment are the Sudan and Somalia, but Saudi Arabia has earned Qadhafi's ire for not doing more to keep up oil prices and for its relatively moderate stance on the Middle East issue. Sabotage directed at Saudi facilities in retaliation for Riyadh's oil policies could remove several million b/d of oil from the market. [REDACTED]

25X1

Two factors will operate on Qadhafi to restrain his subversive activity in the intermediate future: his effort not to upset his one-year chairmanship of the OAU which begins in August; and the reduction in Libyan oil revenues and foreign exchange reserves resulting from the oil glut. Terrorism, subversion, and training foreign dissidents are not a big drain on foreign exchange, however, and clearly will not be eliminated. [REDACTED]

25X1

The Yemens. The Yemen Arab Republic, significant to the US mainly because it borders on Saudi Arabia and the southern gateway to the Red Sea, is highly unstable. Deeply splintered along tribal, sectarian, ideological and geographical lines, the country has been wracked over the past 20 years by revolution, civil war, and political assassinations, military coups, and an ongoing insurgency. Sandwiched between Saudi Arabia and the Marxist Peoples Democratic Republic of Yemen, North Yemeni leaders maintain a balancing act among their neighbors. The Saudis have sought to prop up the central government as a buffer against subversion from the South, but also have tried to keep Sana relatively weak and susceptible to manipulation by subsidizing Yemen's semi-autonomous tribes. The net effect has been to increase the North's vulnerability to subversion by South Yemen. [REDACTED]

25X1

South Yemen has wooed the North with unity talks and, at the same time, tried to subvert and overthrow its government. Tensions between the two have erupted into military clashes on several occasions, including a full-scale border war in 1979 and battling in recent months. The south is presently backing the Marxist-led National Democratic Front insurgency in southern North Yemen. [REDACTED]

25X1

The Soviets have patiently and persistently sought to exploit these conditions to expand their influence. Moscow presently has about 700 military advisors in the North Yemen Armed Forces and is training 1,500 Yemeni officers and enlisted men in the Soviet Union. [REDACTED]

25X1

The prospect over the next few years is, at best, for continued instability that could deteriorate into civil war. For the US and Saudis, the greatest danger is that the Soviets, using agents of influence and the insurgents, will gradually gain control of the government. Fearing this, Saudi leaders have recently decided reluctantly to give Salih more support and to urge the US to do likewise. Tanker traffic through the Bab el



Mandeb Strait could be threatened from the Yemens, but this waterway has lost some of its significance for oil trade now that a new crude pipeline across the Arabian Peninsula allows oil to be shipped directly to the Red Sea. [REDACTED]

Morocco/Western Sahara. The conflict between Morocco and Polisario Front guerrillas over Western Sahara could drag on for years. It conceivably could involve other Arab nations, although the odds are that this will not happen. Neither the Polisario nor Morocco is capable of winning the war militarily, but both are prepared to continue fighting. [REDACTED]

Horn of Africa. The numerous ethnic and international conflicts endemic to the Horn of Africa, which guards important sea routes into and out of the Red Sea, involve primarily Ethiopia and Somalia. In recent years, the disputes have been intensified by heightened superpower involvement in the region. At present, Ethiopia enjoys the upper hand militarily in its ethnic Somali-inhabited Ogaden region and is engaged in an offensive aimed at suppressing regional revolts in the north. The northern campaign could lead to clashes with Sudanese forces as Addis Ababa attempts to seal the frontier infiltration by Eritrean insurgents using bases in the Sudan. Somalia retains its irredentist claims to the Ogaden, as well as less aggressively pursued claims on Djibouti and northeastern Kenya. [REDACTED]

Within Ethiopia, the numerous regional revolts that flared following the 1974 revolution persist, most actively in the north of the country. The Ethiopians have received Soviet and Libyan aid in conducting the current offensive, which has made significant progress but will not succeed in pacifying the region. [REDACTED]

Caribbean. Military modernization under way for the past five years has given Cuba the capability of temporarily obstructing the bulk of US oil imports during time of war. Approximately 40 percent of all US oil imports passes through either the Yucatan or Florida Straits, within 100 miles of Cuba. We do not believe that Havana, in the absence of a direct confrontation with the US, would attempt to block oil deliveries. [REDACTED]

### Gas Supply Disruptions

Based on expected levels of gas consumption and imports, gas supply disruptions do not appear to pose a major threat to the United States, Japan or Western Europe in the next 5-6 years. Beginning in the late 1980s, however, growing dependence on imported gas could pose problems for Western Europe. Although Japan will rely on imports for the bulk of its natural gas needs, increasing fuel switching capability will give the Japanese some measure of protection against gas disruption. US imports, the

bulk coming from Mexico and Canada, are expected to be less than 15 percent of total gas needs and less than 3 percent of total energy consumption. [REDACTED]

Beginning in the late 1980s growing dependence on imported gas could pose problems for Western Europe if the Soviet pipeline project proceeds, and if measures are not taken to limit vulnerability. The Soviets might be inclined to disrupt gas supplies to Western Europe for several reasons.

- o To pressure West European governments to adopt policies more favorable to the Soviet Union.
- o To countervail economic sanctions, including a grain embargo that would be so severe as to reduce Soviet hard currency requirements.

By 1990, gas supplies subject to disruption (from Algeria, Libya and the Soviet Union) could supply almost 40 percent of overall gas demand in Western Europe, and an even higher percentage in France and Italy (see table attached). A gas supply disruption to Europe, therefore, is potentially quite serious, particularly in the event that suppliers were to act in concert. The seasonal nature of gas requirements will tend to magnify the potential impact (Table 14). West European winter gas consumption, for example, currently peaks at 870 million cubic meters per day (5.3 million b/d oil equivalent) while summer requirements decline to as low as 370 million cubic meters per day. [REDACTED]

In 1990, German imports of gas from the Soviet Union are contracted to be 22.4 billion cubic meters (bcm), about 35 percent of expected demand (Table 15). French imports would be an additional 12.7 bcm. In winter, supplies from domestic wells and contract volumes from Holland and Norway could be fully committed, so both countries would have to turn to the Netherlands to request additional "surge production" to make up for the shortfall. Potential Dutch surge capacity over existing production levels is estimated to be 350 million cubic meters per day (mcm/day), sustainable for one year. The volume of gas that France and Germany would have lost through a USSR only embargo would be about 100 mcm/day, and could be replaced relatively easily by the Dutch. [REDACTED]

A USSR only gas disruption, however, is not the only risk. Another scenario could involve the coincident disruption of supplies from the USSR, Algeria, and Libya. Altogether these three suppliers could be providing as much as 70 percent of total Italian gas supplies, half of French requirements and more than one-third of West German needs by 1990. Although such a disruption is possible, we believe the circumstances leading to a joint action are remote. More likely a major interruption from one area would result in higher prices but continued supplies from the unaffected regions. One plausible scenario that would

result in the complete disruption of gas supplies from all three countries would involve an Algerian and Libyan cutoff to support unacceptably high price demands following a politically inspired Soviet disruption. [REDACTED]

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Even though Japanese gas consumption is expected to more than double, Japan probably could withstand a major supply disruption as long as alternative oil supplies can be obtained. The Japanese electricity generating industry--the principal gas consumer--maintains a significant ability to switch to alternative fuels. Currently 62 percent of LNG fired capacity can switch to alternative fuels and even by 1990, the utilities will have the capability to cut gas consumption by nearly 40 percent of total gas use. Moreover, Japan is expected to be importing LNG from 6 or 7 different sources. [REDACTED]

25X1

Table 14

Continental Europe: 1990  
Daily Gas Flows in Peak Winter Months

(million cubic meters per day)

Estimated gas demand	1090 <sup>1</sup>
Soviet gas	160
Dutch gas	150
Other imports	140
Estimated domestic production	290
Stock draw	350

Offsets to Complete Soviet Cutoff

Gas Storage	0	
Dutch Surge capacity <sup>2</sup>	350	(1 year)

---

<sup>1</sup> Peak winter demand.

<sup>2</sup> Dutch surge capacity is 500 mcm/day at present and could be used at this rate for approximately one year. This capacity may decline over time depending on the rate of production from the Groningen field.

**Table 15**  
**Projected Gas Supplies 1990**  
**(billion cubic meters)**

	<u>Total Gas Demand</u>	<u>Insecure Imports</u>			<u>Insecure as percent of total</u>
		<u>Soviet Union</u>	<u>Algeria</u>	<u>Libya</u>	
<b>FRG</b>	<b>63</b>	<b>22.4</b>			<b>35.6</b>
<b>France</b>	<b>42.7</b>	<b>12.7</b>	<b>9.3</b>		<b>51.5</b>
<b>Italy</b>	<b>43</b>	<b>15.1</b>	<b>12.5</b>	<b>2.4</b>	<b>69.7</b>

### Coal Supply Disruption

Coal imports are expected to represent more than 30 percent of West European needs by 1990 and virtually all of Japan's coal supplies. Western use of coal as an energy input is currently characterized by a number of conditions which make coal supplies relatively invulnerable to catastrophic disruption.

- o Most steam coal used in Western nations is indigenously produced.
- o Coal which is imported by Western nations comes from a wide variety of geographically separate sources, many of which are located in other industrialized nations which are likely to have a high degree of political and commercial reliability.
- o Major users of coal, particularly electric utilities, traditionally have maintained high levels of stocks to guard against traditional supply disruptions caused by bad weather or labor difficulties.
- o A substantial degree of excess production capacity exists in major coal-producing nations which can be utilized to increase supplies relatively rapidly in the event of disruption of a traditional source of supply. (This aspect of the coal market accounted for the US ability to meet European coal needs during the disruption of Polish supplies in 1980-81.)

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Under present conditions, market responses to any foreseeable disruption will be sufficient to replace lost supplies in a time-frame short enough to avoid significant damage to Western economies. Any associated problems with transport bottlenecks will be manageable by market participants, as were the bottlenecks in US ports during the Polish disruption.

25X1

Over the longer term, assuming Western European and Japanese reliance on imported steam coal increases in accordance with current projections, a number of interrelated issues will bear consideration by policymakers, including:

- o Possible development of vulnerable choke-points in international steam coal trade such as, for example, Richards Bay harbor in South Africa.
- o Strategic implications of the necessity to protect sea lanes for coal trade which may be substantially different from those currently used for oil trade.
- o Adequacy of stocks in Europe and Japan.

- o Availability of dual-fired equipment or alternate energy supplies in the most sensitive sectors (e.g. electricity generation), to make possible an effective response by market participants to price signals generated by any substantial disruption. [REDACTED]

25X1

At the most likely rate of growth for coal consumption, the coal market will be characterized by considerable slack for some time to come. These issues will therefore not need to be considered in detail before the latter part of this decade.

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Appendix A

Energy Projections



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Total Free World Energy Consumption	F 102.0	E 102.4	WEO 104.5	A 104.8	D 105.6	WEO 106.7			Range 102-107
Free World Oil Consumption	WEO 48.0	B 48.5	E 48.8	DOE 49.0	WEO 50.0	F 50.0	A 50.6	D 51.6	Range 48-52
OECD	F 35.0	WEO 35.2	WEO 35.8	DOE 36.2	D 38.3	IEA 38.9			Range 35-39
Rest of Free World	WEO 12.8	DOE 12.8	D 13.3	WEO 14.2	F 15.0				Range 13-15
Free World Oil Supply	WEO 48.0	DOE 49.0	B 49.0	E 49.0	F 50.0	WEO 50.0	A 50.6	C 51.2	
								D 52.3	Range 48-52
OECD	C 12.9	IEA 14.2	D 14.3	DOE 14.6	A 14.9	WEO 15.0	E 15.1	F 16.0	Range 13-16
OPEC	WEO 23.0	E 23.2	B 23.9	F 25.0	DOE 25.4	WEO 26.0	A 26.3	D 28.4	
								C 28.5	Range 23-28
Other LDCs	WEO 8.0	A 8.7	F 9.0	D 9.0	DOE 9.0	C 9.1	WEO 9.3	E 9.3	Range 8-9
CPE (Imports) Exports	WEO (1)	D (0.1)	F 0	DOE 0	B 0.6	C 0.7	A 0.7	E 0.8	
								WEO 1.0	Range (1)-1
OPEC Oil Productive Capacity									
Maximum Sustainable	DOE 29.7 - 35.0		CIA 32.0 - 34.5						
Available	IEA 23.0 - 26.0		CIA 30.0 - 32.5						
US Total Energy Consumption	E 37.4	A 38.5	D 39.8	IEA 40.7					
Non-Oil	E 21.4	A 22.7	D 23.3	IEA 24.0					
Oil	B 15.4	A 15.8	E 16.0	F 16.0	DOE 16.2	D 16.5	IEA 16.7	Range 15-17	
Net Trade (Imports) Exports									
Oil	F (5.1)	E (5.6)	DOE (6.4)	D (6.8)	IEA (7.1)	A (7.5)	Range (5)-(8)		
Gas	C (1.1)	IEA (0.9)	DOE (0.8)	A (0.2)					
Coal	C 1.2	IEA 1.3	DOE 1.4	A 1.5					
									Range 1-2

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Western Europe	A	E	WEO	DRI	WEO	IEA	D		Range
Total Energy Consumption	26.7	26.7	27.5	27.7	27.8	28.4	28.6		27-29
Non-Oil	A	E	DRI	D	WEO	WEO	IEA		Range
	13.9	14.0	14.5	15.0	15.2	15.3	15.3		14-15
Oil	WEO	WEO	DOE	E	A	IEA	DRI	D	Range
Net Trade (Imports)	12.2	12.6	12.6	12.7	12.8	13.1	13.2	13.6	12-14
Exports									
Oil	A	WEO	DOE	WEO	E	IEA	DRI	D	Range
	(8.9)	(9.1)	(9.2)	(9.5)	(9.5)	(9.9)	(10.0)	(10.4)	(9)-(11)
Gas	IEA	C	WEO	WEO	DOE	DRI			(1)
	(1.2)	(1.1)	(0.8)	(0.8)	(0.7)	(0.6)			
Coal	WEO	WEO	IEA	C	DOE	DRI			Range
	(2.1)	(1.8)	(1.8)	(1.7)	(1.4)	(1.2)			(2)-(1)
Japan Total Energy Consumption	E	D	A	IEA					Range
	7.8	8.3	8.5	10.4					8-10
Non-Oil	D	A	E	IEA					Range
	3.1	3.2	3.3	3.9					3-4
Oil	E	D	A	DOE	IEA				Range
	4.5	5.2	5.3	5.4	6.5				5-7
Net Trade (Imports)									
Exports									
Oil	E	D	A	DOE	IEA				Range
	(4.5)	(5.2)	(5.3)	(5.4)	(6.5)				(5)-(7)
Gas	IEA	C	DOE						Range
	(0.7)	(0.9)	(1.0)						(1)
Coal	C	DOE	IEA						Range
	(1.3)	(1.4)	(1.4)						(1)

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Energy I Actions

(million b/d oil equivalent)

1990

Total Free World Energy Consumption	E 115.7	F 116.0	WEO 117.2	D 117.3	A 118.5	WEO 125.4			Range 116-125
Free World Oil Consumption	B 49.9	WEO 50.0	DOE 50.7	E 50.7	F 51.0	A 52.7	C 53.0	D 53.1	Range 50-56
	WEO 56								
OECD	F 33.0	WEO 34.0	DOE 35.1	C 36.0	WEO 37.0	IEA 37.3	D 37.8		Range 33-38
Rest of Free World	D 15.3	DOE 15.6	WEO 16.0	C 17.0	F 18.0	WEO 19			Range 15-19
Free World Oil Supply	WEO 48.0	E 50.7	DOE 50.7	WEO 52.0	A 52.7	C 53.1	D 53.1		Range 48-53
OECD	C 17.4	WEO 13.2	WEO 13.4	D 13.8	IEA 14.3	DOE 14.8	F 15.0	A 15.6	Range 12-16
	E 16.0								
OPEC	E 23.0	B 24.7	A 25.8	DOE 26.3	WEO 27.0	C 27.9	D 28.5	WEO 29.0	Range 23-29
	F 29.0								
LDCs	WEO 8.0	F 9.0	DOE 9.6	C 10.1	D 10.4	E 10.7	WEO 11.0	A 11.2	Range 8-11
CPE (Imports) Exports	F (2.0)	WEO (2.0)	D (0.5)	WEO 0	DOE 0	A 0.1	E 0.5		Range (2)-1
OPEC Productive Capacity									
Maximum Sustainable	DOE 29.1-35.9		CIA 30.5-34.0	A 40.8					Range 29-41
Available	IEA 27.0-29.0		CIA 27.5-32.0	A 31.3					Range 27-32
US Total Energy Consumption	A 39.5	E 40.3	D 41.4	IEA 43.3					Range 40-43
Non-Oil	A 24.2	E 24.3	D 25.7	IEA 28.1					Range 24-28
Oil	B 14.8	IEA 15.2	A 15.3	DOE 15.6	D 15.7	C 16.0	E 16.0	F 16.0	Range 15-16
Net Trade (Imports) Exports									
Oil	F (4.8)	E (5.5)	IEA (5.6)	DOE (6.1)	D (6.3)	A (7.3)	C (8.2)		Range (5)-(8)
Gas	A (0.5)	DOE (0.9)	IEA (1.0)	C (1.1)					Range (1)
Coal	DOE 1.5	IEA 1.8	A 1.9	C 2.1					Range

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Western Europe Total Energy Consumption	E 28.7	A 29.0	WEO 30.6	DRI 31.2	IEA 31.2	D 31.3	WEO 32	Range 29-32
Non-Oil	E 16.2	A 16.7	DRI 17.2	D 17.7	IEA 18.6	WEO 19.4	WEO 20	Range 16-20
Oil	WEO 11.2	C 12.0	WEO 12.0	A 12.3	DOE 12.4	E 12.5	IEA 12.6	Range 11-14
	B 13.1	D 13.6	DRI 14.0					
Net Trade (Imports) Exports								
Oil	A (8.0)	C (8.4)	WEO (8.5)	DOE (9.0)	E (9.1)	WEO (9.3)	IEA (9.6)	Range (8)-(11)
	B (9.9)	D (10.5)	DRI (10.7)					
Gas	DRI (1.3)	C (1.8)	DOE (1.9)	IEA (1.9)	WEO (1.9)	WEO (2.1)		Range (1)-(2)
Coal	DRI (2.1)	DOE (2.5)	C (2.8)	WEO (2.8)	IEA (3.0)	WEO (3.1)		Range (2)-(3)
Japan Total Energy Consumption	E 8.7	D 9.5	A 10.4	IEA 13.0				Range 9-13
Non-Oil	D 3.9	E 4.4	A 4.9	IEA 6.0				Range 4-6
Oil	E 4.3	C 5.0	B 5.1	DOE 5.2	D 5.6	A 5.5	IEA 7.0	Range 4-7
Net Trade (Imports) Exports								
Oil	E (4.3)	C (5.0)	B (5.1)	DOE (5.2)	D (5.6)	A (5.5)	IEA (7.0)	Range (4)-(7)
Gas	IEA (1.2)	DOE (1.3)						Range (1)
Coal	DOE (1.7)	IEA (2.0)	WEO (2.9)					Range (2)-(3)

\*Firm C US import requirement figure excludes any synfuel production.

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(million b/d o. equivalent)

2000

Total Free World Energy Consumption	F 143.0	E 144.0	A 151.9						25X1	Range 143-152
Free World Oil Consumption	DOE 54.5	F 55.0	B 55.1	E 56.8	A 57.9	C 58.0	WEO 58.0	WEO 74.0		Range 55-74
OECD	F 31.0	WEO 33.0	DOE 33.1	C 35.0	WEO 43.0					Range 31-43
Rest of Free World	DOE 21.4	C 23.0	F 24.0	WEO 25.0	WEO 31.0					Range 21-31
Free World Oil Supply	WEO 49.0	WEO 53.0	DOE 54.5	F 55.0	B 55.1	E 56.8	A 57.9	C 58.4		Range 49-58
OECD	F 13.0	WEO 13.0	C 13.8	WEO 15.0	DOE 15.4	E 16.6	A 16.8			Range 13-17
OPEC	WEO 24.0	C 26.0	DOE 27.0	WEO 28.0	E 28.3	B 29.0	A 29.3	F 30.0		Range 24-30
Other LDCs	WEO 9.0	E 10.9	DOE 12.1	A 12.3	C 12.5	WEO 13.0	F 13.0			Range 9-13
CPE (Imports) Exports	WEO (2.0)	F (1.0)	A (0.5)	B (0.2)	DOE 0	E (0.6)				Range (2)-1
OPEC Oil Productive Capacity										
Maximum Sustainable	DOE 26.2-33.8		A 42.5							Range 26-43
Available	WEO 24.0-28.0		A 32.1							24-32
US Total Energy Consumption	A 43.2	E 45.3								Range 43-45
Non-Oil	A 28.9	E 29.6								Range 29-30
Oil	DOE 14.2	A 14.3	C 15.0	F 15.0	B 15.1	E 15.7				Range 14-16
Net Trade (Imports) Exports										
Oil	F (4.1)	DOE (4.4)	A (5.4)	D (5.7)	E (5.8)	C* (6.1)				Range (4)-(7)
Gas	A (0.4)	DOE (1.0)	C (1.4)							Range (1)
Coal	A 2.6	DOE 2.8	C 4.1							Range 3-4
Western Europe Total Energy Consumption	E 32.4	A 33.1	WEO 37.0	WEO 43.0						Range 32-43
Non-Oil	E 20.0	A 21.6	WEO 26.5	WEO 37.4						Range 20-27
Oil	WEO 10.5	A 11.5	C 12.0	DOE 12.2	E 12.4	B 14.1	WEO 15.6	25X1		Range 11-16

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Net Trade (Imports) Exports								25X1	
Oil	A (6.8)	WEO (7.4)	DOE (8.5)	C (8.7)	E (9.5)	B (11.4)	WEO (13.3)	Range (7)-(13)	
Gas	DOE (2.4)	C (2.7)	WEO (2.7)	WEO (2.9)	Range (2)-(3)				
Coal	C (4.1)	DOE (4.8)	WEO (5.6)	WEO (5.8)	Range (4)-(6)				
Japan Total Energy Consumption	E 10.6	A 14.2					Range 11-14		
Non-Oil	E 6.0	A 9.0					Range 6-9		
Oil	C 4.0	E 4.6	DOE 5.0	A 5.2	B 5.5	Range 4-6			
Net Trade (Imports) Exports									
Oil	C (4.0)	A (5.0)	DOE (5.0)	B (5.5)	Range (4)-(6)				
Gas	DOE (1.6)	C (2.0)					Range (2)		
Coal	C (1.4)	DOE (2.3)					Range (1)-(2)		

Figure C US import requirement figure excludes synfuel production.

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Appendix BMajor Choke Points and System VulnerabilityProducing Country Choke Points

Petroleum systems are comprised of a number of facilities which perform functions essential to the production and export of crude oil. Such facilities are considered choke points if they handle a large volume of crude and their closure would result in the loss in availability of a significant portion of that volume. These choke points are considered critical if the lead time to repair, replace, or bypass a high level of damage and restore the facility to service would be at least two months or more. [REDACTED]

25X1

In assessing petroleum systems of major oil exporting countries, a minimum 200,000 b/d capacity is generally used to designate a facility as a critical choke point. Using this criterion, a survey of Free World petroleum systems would identify hundreds of such facilities. This analysis can be further disaggregated within particular facilities to identify the essential functions (i.e., gas-oil separation, pumping, stabilization, storage, and export) and essential components (e.g. separation vessels, large valves, pumps, stabilizer columns, loading arms, mooring buoys, etc.). [REDACTED]

25X1

For purposes of the present analysis, a selected and certainly not exhaustive list of the more critical facility choke points in major oil exporting countries is provided. Such facilities are generally exposed and readily identifiable; therefore, they are potentially vulnerable to some form of damage. Concentrated and well organized attacks could result in a significant level of damage to a large portion of any export system. [REDACTED]

25X1

Some major petroleum systems are designed with considerable flexibility and redundancy. Saudi Arabia, for example, is able to move crude through one of three in-country export terminals. Although Libya has five distinct export systems, the pipelines which transport crude from oilfields to export terminals cross each other, so that some diversion can be accomplished in an emergency. In contrast, Kuwait must rely on one export terminal to ship its oil. Iraq probably had greater flexibility in its distribution and export system than any other major petroleum exporter, but war damage to its Persian Gulf terminals and political difficulties with Syria have eliminated most of its export options. [REDACTED]

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The time required to restore petroleum facilities to service once extensive damage occurs will vary based on a number of factors. These include:

- o The determination of which critical components have been damaged.
- o The adequacy of in-country capital equipment inventories.
- o The fabrication and delivery time from foreign equipment suppliers.
- o Decisions on whether to cannibalize equipment from less essential facilities.
- o Decisions on whether to repair, replace or bypass critical components.
- o The availability of work crews and reconstruction strategies adopted.
- o Access to the damaged facilities as determined by the general security of the area.
- o The urgency of the effort as perceived by the authorities. [REDACTED]

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It is possible to restore damaged facilities to partial operation within a relatively short period, even though complete reconstruction will take an extensive amount of time. For example, Iraq will require from 18-24 months from the time the war ends to fully restore its damaged Sea Island export terminals in the Persian Gulf. Iraqi petroleum officials have devised a strategy to install single point mooring (SPM) buoys to provide temporary tanker loading until the Sea Island berths can be rebuilt. The essential components already have been purchased from foreign suppliers and delivered to a staging area in Bahrain--a task that required several months. The on-site fabrication and installation will take approximately four months. If the subsea components had been in place prior to the war and the remaining equipment in stock, the lead time for an operational SPM would have been reduced to as little as one month. [REDACTED]

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#### International Distribution Choke Points

Approximately 60 percent of the Free World's oil is transported by water, with half of this shipped through the Strait of Hormuz. While most oil searoutes proceed through other, similarly restricted passages, particularly on the periphery of the Indian Ocean, only the route around the Cape of Good Hope carries even half the oil volume of Hormuz. Over the short term, closure of any of these areas would disrupt world oil distribution networks. With the exception of the Strait of Hormuz, however, most can readily be bypassed by rerouting tankers. [REDACTED]

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In certain key areas international pipelines are assuming a greater role in the transportation of hydrocarbons, although only those in the Middle East carry volumes to rival seaborne routes. In Europe, pipelines play a major role in moving North Sea oil and gas, and in bringing Soviet gas to the West. A doubling of Soviet imports over the next five years would result in these pipelines carrying natural gas volumes equivalent to about 900,000 b/d of crude oil. Unlike oil, however, gas supplies cannot be redistributed easily. Most pipeline damage can be repaired in a matter of days or weeks.

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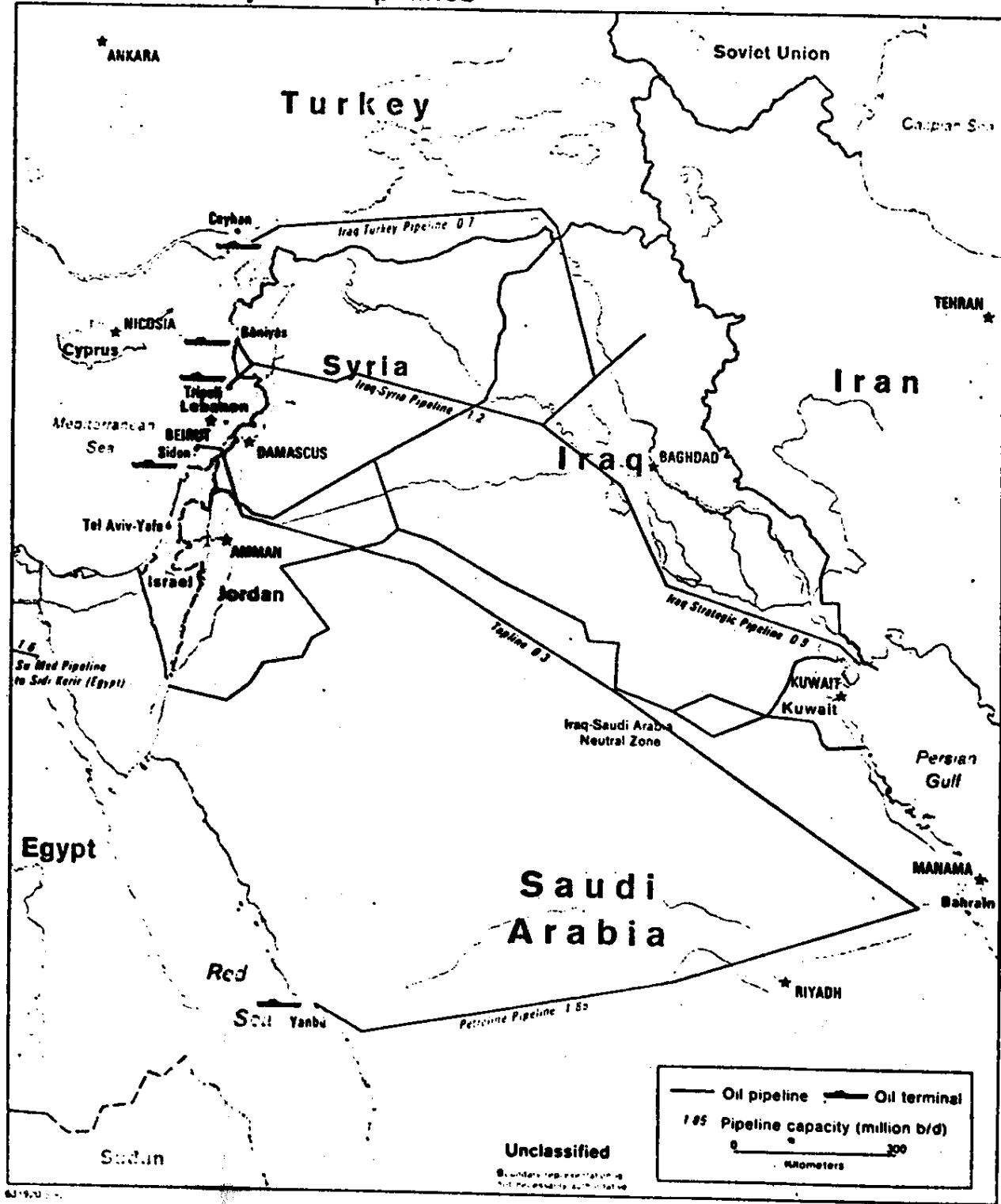
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Middle East: Major Oil Pipelines



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# Europe: Major Natural Gas Supply Routes



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